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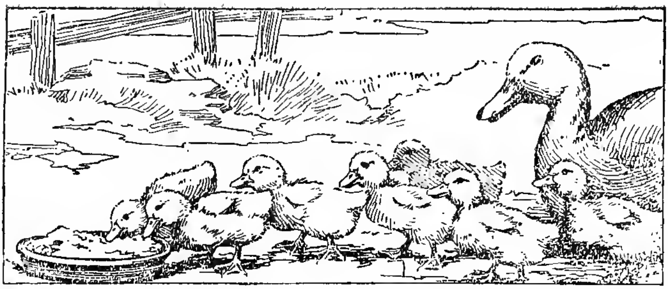

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PREFACE

THE persistent call from my correspondents, readers and students for a text-book on duck-keeping has urged me to write this volume in the hope that it will supply the long-felt need of a complete guide. That, however, has been but one of my objects. I have also been prompted by the merits of the duck, for which I hold the greatest respect and in which I have always had the greatest confidence. To appeal to the public to keep ducks has in the past been but to utter a cry in the wilderness, and but for the greatest war of all times the position of the duck might still have been the undeserved obscurity in which it has been wrapped.

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The duck of to-day is little different to that of yesterday. It always teemed with utility merits, as those who have kept it will bear me out. Why then have supporters been so few ? One of the chief reasons is that those in whose keeping are (or should be) the interests of our smaller livestock have not given of their best. Has the Board of Agriculture arranged or subsidized a duck-laying competition ? Has the Board in the severest food-shortage this country and the world have ever known recognized the merits of the duck ? Has the Board even replaced the leaflets on duck-keeping they withdrew from publication as " out of date " some time ago ? Echo answers " No."

Duck-keeping is now spreading rapidly throughout these Isles, thus making future prospects very encouraging. The thousands of recruits now taking up the cult of the duck will always be keen supporters. The duck will see to that by laying the golden egg (credited in the past exclusively to the goose) and by supplying a substitute for the Sunday joint. Easy to manage, almost free from ailments, a splendid forager, an every-day layer, and a converter of allotment waste into valuable eggs and flesh—the duck will not be denied. The laying duck of to-morrow too will excel what has gone before if only because its supporters will by selective breeding, and scientific feeding and management, evolve strains that will yield more and still more eggs.

Should this work encourage you to take up duck-keeping my efforts will have been rewarded. The text will I hope show you how to keep the ducks in lay and pay and they in turn will on their merits see that you ever after own a flock.

W. POWELL-OWEN.

CONTENTS

SECTION I: DUCKS

CHAP. PAGE

I The Cult of the Duck 11

II Principles that Govern Housing 24

III Breeding on Progressive Lines 48

IV Hatching: Natural and Artificial. . . . 91

V Rearing: Natural and Artificial 104

VI Management on Common-sense Lines . . . 115

VII Rearing Ducklings for the Table 126

VIII Feeding and Foraging 159

IX A Clean Bill of Health 170

X Breeds as you should know them 175

XI Pointers to remember in Duck-keeping . . . 189

SECTION II Geese 193

„ III Turkeys 203

„ IV Guinea-Fowl 216

CHAPTER I

THE CULT OF THE DUCK

Suitable Environment—On Free Range—Hens and Ducks—Ducks and Fruit—The Smallholder—For Confined Runs—Near a River—Ducks versus Hens—Harvests—Egg-production—Eggs all the Year Round.

WHY in the past so few have taken any live interest in the cult of the duck passes my comprehension. Ducks have everything to recommend them, and in the hands of the proper person and amid suitable environment they should prove exceedingly remunerative.

Suitable Environment.—Although ducks have many real advantages over the hen they must be provided with suitable environment. The surroundings of the individual must be carefully considered on their separate merits and the branch of duck-keeping adopted must fit in with the conditions. Then a breed must be taken up that best fits in with the proposed plan. If the would-be duck-keeper will, before starting, bear in mind the above, he or she will be on the road to success.

One must be guided by his environment as to whether duck-keeping is to be run as a side-line or as an extensive speciality on "farming" methods. There is good money for all who will take up the cult of the duck, which furnishes the owner with quite as many products as the busy-body hen. These include new-laid eggs, sittings, day-old ducklings, table ducklings, pedigree stock, etc. This being so it is more surprising to me that the heavy-laying strain of duck has not been more fully exploited commercially. Still it is never too late to mend, and the opportunities ahead of all my readers who will grasp them are very many and highly remunerative so long as my general principles are not abused. As with poultry-keeping business methods score heavily and are all a part of the undertaking.

On Free Range.—The keeping of ducks for egg-production on a large scale is best suited to the farmer or the person with plenty of land available. To the farmer a large flock of ducks should prove one of his best investments, bringing in returns much more valuable than those from any of his crops. Housing need cost him nothing, as he should have at his disposal plenty of suitable disused outhouses that can be converted into duck-houses. Swimming water is not a *sine qua non*, particularly for ducks kept solely for egg-production. And land ducks like the Indian Runner are not by nature " water " ducks, thus bringing out the point that the breed selected *must* fit in with the individual's environment. Ducklings being fattened for the table must not be provided with swimming water if the best weights are to be secured, and it is only where breeding stock are concerned that water to swim in is a real asset. It is then an aid to fertility, although if the stock ducks are running on grass fertility is good without water. The average farmer, however, usually has a good-sized pond close at hand which he can hand over to the ducks to advantage.

There are plenty of well-to-do people in the country, however, who have ideal range for a flock of ducks and are yet unaware of the fact that ducks should strongly appeal to them. I refer to those people with liberal range of pasture and woodland and with or without swimming water. Woodland is ideal for ducks in that it abounds with natural foodstuffs and provides at the same time valuable shelter and shade. Such persons too in the majority of cases have unused outhouses they can hand over as quarters for the ducks, their outlay then being for the stock only. A duck-pond can very cheaply be installed if desired, or there may be a river or stream quite handy which the ducks will soon discover and make full use of. Ponds abound with animal life of every description—the natural food of the duck—so that where they are available it is an advantage. On the other hand, as I have said, the absence of swimming water should not deter any one with suitable range from keeping ducks, " land " varieties being selected to help matters.

Those with free range I have in mind usually have plenty of ground available on which they can grow crops for the ducks, and that is another real advantage. Greenstuff should figure very prominently in the dietary of ducks of all ages.

Hens and Ducks.—Following upon my line of argument that the keeping of ducks should be governed in extent by the environment of the individual keeper, I must say a few words to the poultry-farmer. Often the latter is tempted to go in for ducks on a large scale regardless of the surroundings. The average poultry-farm is on the small size, say up to seven acres, and it is usually well stocked with poultry. One should therefore think twice before taking up the cult of the duck on such already crowded land. When confined to small quarters, if the ground is overstocked, the land may in time become tainted and owing to the cramped conditions the stock cannot be shifted whilst the used ground has a rest.

On some farms there is often a small pond, and I should be the last to suggest that it should remain idle. All I caution the reader to bear in mind is the studying of environment and commencing operations accordingly. Should I find myself with a small natural pond within the borders of my five or seven acre poultry-farm my first step would be to section it off with wire-netting—two feet high—and enclosing with it a certain amount of grass land also netted off. A distance from the pond and on high dry ground I should place within the netting enclosure my duck-house. I should think carefully over the best branch of duck-keeping to take up. I might run a small flock of ducks headed by a drake or two and sell the eggs in season for sitting purposes. Or I might hatch the eggs in my incubator, and sell the day-old ducklings that were hatched out. On the other hand, I might sell a given number of ducklings and set aside a suitable spot—perhaps the orchard—where I could rear and fatten them for table. If the latter plan was carried out the land would be resting out of season.

Again, in making use of such a natural pond set within limited quarters, I should be very careful to select the proper breed. I should not be well advised to take up a variety that called for ample range. My motto of "study individual environment" would compel me to select a breed that was suitable for a confined area, and one that would at the same time give me my finished product, whatever that might be.

Ducks and poultry should not be allowed to run together indiscriminately, and since ducks can be controlled by two-feet wire-netting there is no difficulty in controlling them. If any ponds are stagnant, or required for the larger livestock, and the ducks are to be forbidden access to same, low wire-netting will keep them controlled, and at very little cost, which is a great advantage.

Ducks and Fruit.—There is not the least doubt that duck-keeping on a small scale should appeal to those with orchards. Ducks do not scratch up the grass like hens, but rather improve it by their free droppings. I have in mind instances where much profit has been made from a quartet or quintet of breeding ducks run loose in an orchard, their eggs being incubated and the ducklings reared and fattened for table. The adults have been kept on from season to season, being housed in a low box-arrangement.

Those with orchards can adopt any plan of duck-keeping they think best. A two-foot length of wire-netting can be erected round the orchard to keep the ducks in, and the owner has merely to step over same when entering the orchard. There are no gates to open and close, and labour is therefore reduced to a minimum. A few adult breeding ducks can be kept within the enclosure to provide the eggs for incubation, or they can be housed separately. The ducklings are reared in the orchard and marketed when "ripe." If so desired, the eggs can be purchased and the resultant ducklings fattened.

By this plan all garden waste and small vegetables can be profitably used up to bring in a good return. With all livestock economic production should be an important consideration, and small potatoes can represent the foundation of the mash for the ducklings being fattened.

Where ducklings are run in an orchard they will rid it of insects and the like, and the trees will provide the much desired shade. What is more, there will be a top crop as well as a bottom one on the same piece of ground.

The Smallholder.—The smallholder must also decide upon the branch of duck-keeping to take up according to his environment. He may run a small flock of breeding stock from which to sell sittings in season or day-old ducklings, or to provide eggs for his incubators to supply him with ducklings to fatten for the table. On the other hand, he may find himself adjacent to a nice stream where the ducks can enjoy a daily swim and find much natural food, and all that he will have to provide is suitable accommodation for the flock of breeders. Again, he may not wish to keep breeding stock but may prefer to buy eggs for hatching and incubate them to provide ducklings for the table. In many cases he will be near a common, where the ducks can run out on range, and a pond or stream is usually to be met with amid such environment.

For Confined Areas.—Whilst ducks should appeal strongly to all who possess free range, they can be kept profitably in confined runs. I have seen hundreds upon hundreds of small flocks of ducks kept for laying in backyards, being provided with a sleeping-place and covered-in run just as if they were hens. Sometimes I have seen ducks and hens running together in the same confined run, although this naturally goes against my recommendation. I have, however, been surprised at the splendid egg-results of ducks so kept in backyards.

In a number of such cases the duck-keeper has installed a sunken swimming bath or a small well-planned pond, and has secured a very high percentage of fertile eggs from the flock. Given a suitable breed and with the ground not overcrowded, one might profitably keep ducks in such confined spaces. If two enclosures can be provided so that one can be rested whilst the other is in use, and if the ground is dug up regularly, this will help matters. If, too, a small enclosure can be wired off and converted into a small duck-pond this is to be recommended perhaps, and an attractive "duckery" would be the result.

Near a River.—Many persons find themselves by good fortune —if they did but realize it—near a stream, river or canal. To these a flock of laying ducks should prove highly remunerative. Few, however, are fully alive to the advantages of duck-keeping under such ideal conditions. One can obtain a good idea of this by strolling along the bank of a canal or stream and glancing across to the gardens which border the water on the other side. In very few of those gardens will be noticed duck-houses. All that is necessary with such environment is a well-constructed duck-house standing high and dry a little way from the bank, a doorway through which the ducks can pass and a low wire-netting walk down which the ducks can go prior to entering the water. Near the latter a landing stage will be necessary, and under such conditions the ducks will find ample food for themselves.

The owner of the ducks can use or sell the eggs as new-laids, or run drakes with the flock so that he can sell sittings. On the other hand, he might feel disposed to incubate the eggs and sell day-old ducklings, or raise the latter himself for table purposes.

Ducks v. Hens.—In the first place ducks are very hardy, and suffer from very few ailments. Better fertility is experienced with ducks' eggs than those of the hen, and after they are a week old the ducklings romp along if protected from the hot rays of the sun and from thunderstorms. Ducks remain in profit up to six years if of approved breeding, which is one very great advantage; the hen's period of profit is two years or so. In a garden ducks do not do harm from scratching like biddy, and ducklings will roam amongst garden crops in search of slugs, insects, worms, etc., without in any way interfering with the plants. Ducklings are ready for the table many weeks before chickens and with greater weights, a point that should commend itself in the interests of the nation's food supply.

Properly bred and handled, ducks will lay all the year round, and they are by nature suited to a moist climate such as is experienced here. Again, ducks do not give so much trouble from broodiness as hens, and the eggs of the former are larger and heavier than those of the latter. When we come to the all-important question of plant the duck is well ahead. There is no need for six-foot high wire-netting, as ducks are *waddlers* and can be kept in bounds by netting only two feet high. This is naturally a great consideration! As regards housing, too, ducks require nothing out of the ordinary, and any suitable outhouse can be converted into accommodation whether it be a disused shed, stable or barn.

In the approved type of duck the foraging propensities are very prominent, and if free range of the proper kind is provided the ducks will find much of their food during the greater part of the year. A great saving in food-bills is thus shown, and ducks will thrive and lay well on the cheaper and coarser foodstuffs, and much of the same can comprise vegetables and greenery. There would be no waste where ducks are kept, and they do not call for so much grain as hens. Many ducks do not see grain for long periods when it is dear in even normal times.

Where the foraging is ideal, labour is reduced to a minimum, as the ducks will be out on range all day fending for themselves. They lay their eggs before breakfast and need not be visited till 9 o'clock in the morning when they are fed and released, the eggs being then collected. If the ducks can find plenty of free food out on range they will need no breakfast and will often refuse it if provided, being anxious only to get out and forage. When well handled the ducks will come home to tea, when they can be fed, the duck-keeper's daily task being then over. The labour problem with ducks is therefore reduced to a minimum.

Apart from the initial outlay being much lower for duck-keeping than for poultry culture, depreciation on stock and plant is smaller, and under suitable conditions eggs can be produced from ducks much more cheaply.

Harvests.—The harvests from duck-keeping are identical with those from poultry-keeping. In the seasons there is always a good demand for sittings of eggs and ducklings for stock purposes, also for adults. There are plenty too who purchase eggs for incubation, rearing the young ducklings for the market. In and around Aylesbury in Buckinghamshire almost every cottager rears a number of table ducklings each year for the London market. The eggs are purchased, and broody hens are used to incubate them. There is a brisk trade for day-old ducklings from approved table breeds in almost all districts among those who desire to fatten them up to the marketing stage. A splendid trade can be worked up in the locality by means of progressive advertising, and satisfied customers come year after year.

To meet this large demand for day-old ducklings there is good money for the person who will instal incubators and foster-mothers, or a brooder house, the rearer being necessary to accommodate any ducklings not sold at a day old. These are sold later at higher prices. It often happens that the person selling day-olds buys the eggs from the breeder, not keeping adult breeding stock himself. There is thus a good channel open to all who have flocks of ducks and hatching-eggs for sale.

The duck-keeper, too, can take up the "fancy" side of the industry if he so desires.

In selecting a breed one must naturally study the objective in view. If the eggs for hatching are desired by the purchaser for incubation to supply his customers with ducklings to raise for the market an approved table variety must be chosen. If sittings are sold for stock purposes a laying breed may be selected, or both table and egg varieties may be kept.

There is ample scope for sittings, day-olds and adult stock of first-class laying strains, and good money awaits all who will pay attention to the laying merits of their flocks and breed on progressive lines to increase the egg-yield.

We next come to the edible new-laid. At one time the public had a prejudice against ducks' eggs, averring that they were strongly flavoured. This has, like many other such barriers, been broken down, and those wishing to sell their produce will meet with no difficulty whatever. There are many ways of finding a market for one's produce, whether eggs or table ducklings, and one of the best methods is to design a distinctive brand for same. For eggs the "Dainty" brand would have a good ring, and for table ducklings I might mention as a suitable example "Well-fed." The eggs would be stamped, each one carrying the name of the breeder, the address of the farm and the brand-name, whilst distinctive tags bearing the same data would be fastened to the ducks.

Advertising in the local paper would very quickly work up a profitable and regular trade for the duck-keeper, and he could if he so desired appoint agents here and there to display his produce in their windows, and take orders on commission. Such agents might also take orders for sittings, ducklings and stock ducks. Arrangements might be made with the local corn-chandlers to display in their shop-windows a small brooder and a few ducklings and to take orders for sittings and ducklings over the counter on a commission basis. The business man will score in every direction, and he can call upon his agents twice a week or more to deliver produce and receive orders. A pony and trap will perhaps be a desideratum, but of course one must be guided by his or her individual operations and the extent of same.

Egg-Production.—Why the duck has not been bred extensively on pedigree lines like the hen it is difficult indeed to understand. The hen has for many years now been bred for heavy laying, and to-day individual birds have exceeded the 300 eggs per annum record. The duck, on the other hand, has been sadly neglected except in the case of one or two breeders, who have plodded on knowing that the duck was all that they claimed it to be by way of egg-production.

In this country we have nothing to show by way of official records, for the very reason that Laying Competitions in the past have concentrated on the hen and left the duck out in the cold. Private records are available, however, including that of a Buff Orpington duck which laid 137 eggs in as many days, and that of a trio of Khaki-Campbell ducks which averaged 256 eggs each in twelve months, starting to lay when only about 4½ months old. Strains in Runners in this country exceed the 290-egg, and in Buff Orpington ducks the 250-egg strain has been passed.

For official records in laying contests as regards the duck, we have to go across the water. On next page will be found details of the leading pens in competitions held at the Hawkesbury Agricultural College and Experiment Farm, New South Wales, six ducks comprising a pen.

We can glean many interesting hints from these tables, and first of all we must bear in mind the climate in New South Wales is more suited to the laying hen than the duck. I believe that the six Runners which laid 1,601 eggs in the first-year test published created a world's egg record. As the eggs averaged 31 oz. per dozen, the six laid 258 lb. weight of eggs, or nearly ten times their own weight. I append the daily record of the laying of this pen and the sequence of "sixes" will be at once noticed. Ducks lay their full quota in stretches and not every other day like hens.

April:	0 0 0 0 0 0 0 0 0 0 0 1 1 1 1 1 1 1 1 1 4 1 2 3 4 6 6 6 6 6	53
May:	6 4 5 3 5 4 5 4 3 6 6 6 5 6 6 6 4 3 4 4 3 4 4 6 5 6 4 6 4 6 6	149
June:	6 6 6 6 6 6 5 5 6 6 5 5 6 6 5 5 5 5 5 6 6 5 5 6 6 6 6 6 6 4	167
July:	4 2 4 3 2 3 5 4 4 3 3 6 6 6 6 6 6 6 5 4 6 6 5 6 4 6 6 6 4 5 6	149
August:	3 4 4 3 5 4 6 5 4 4 5 6 5 6 4 6 6 6 5 6 5 6 5 4 4 4 5 5 5 5 5	150
September:	5 4 3 5 5 4 5 5 6 4 4 5 5 5 6 5 6 6 4 6 5 6 6 6 6 6 6 6 6 5	156
October:	3 5 6 3 6 6 5 6 5 5 5 5 4 5 4 4 5 6 4 5 3 5 6 4 5 5 5 4 3 4 6	148
November:	4 5 6 5 4 5 6 5 4 5 2 6 5 5 5 5 6 5 4 5 4 4 3 6 4 5 5 6 5 6	145
December:	6 6 6 6 6 5 5 6 6 5 5 6 6 6 5 5 5 4 3 2 4 5 4 6 4 5 5 5 4 4 6	156
January:	4 4 6 6 6 5 4 5 5 4 4 5 4 4 4 4 4 6 4 4 6 4 4 2 3 4 3 3 4 5 5	135
February	5 5 5 4 3 4 4 3 2 4 4 4 4 6 4 3 5 3 4 2 3 3 2 5 2 3 2 2	100
March:	2 2 2 3 1 4 3 4 3 3 3 3 5 3 3 3 3 3 2 4 3 5 2 3 3 2 4 2 4 3 3	93

As the birds did not commence to lay till April 12, they were kept at the College till April 11, to complete the full twelve months. The laying for this period was as follows: 2 2 4 2 3 3 2 3 3 3 3, making a grand total of 1,631 eggs.

FOURTH-YEAR DUCKS.

Owner, Breed, and Position.	First Year.	Second Year.	Third Year.	April.	May.	June.	July.	August.	Sept.	October.	Nov.	Dec.	January.	Feb.	March.	Fourth Year.	Grand Total.	Weight per doz.
1. G. E. O. Craft, Indian Runners	1034	1019	826	54	33	21	15	30	108	132	123	100	93	48	5	762	3641	oz. 34
2. D. Salter: Indian Runners	1092	1075	644	32	51	70	72	54	66	50	63	70	48	36	13	626	3437	34
3. Hughes Bros.: Buff Orpingtons	1105	882	703	22	16	42	82	21	101	121	87	78	32	23	0	625	3315	34
4. G. Rogers: Indian Runners.	1220	1244	719	42	55	33	76	34	68	78	64	62	40	34	2	588	3771	33

THIRD-YEAR DUCKS.

Owner, Breed, and Position.	First Year.	Second Year.	April.	May.	June.	July.	August.	Sept.	October.	Nov.	Dec.	January.	Feb.	March.	Third Year.	Grand Total.	Weight per doz.
1. Mrs. B. Wakfer: Cantonese	1030	985	56	79	50	85	96	78	117	113	118	96	68	30	986	3001	oz. 28
2. G. E. O. Craft: Indian Runners	1120	764	80	70	45	58	44	81	138	114	99	64	33	0	826	2710	34
3. G. Plowman: Indian Runners	1122	830	47	57	42	56	86	106	110	86	95	69	35	8	797	2749	32
4. Bright and Thompson: Indian Runners	1090	771	28	37	45	41	14	96	145	117	104	75	50	34	786	2647	34
5. H. Short: Indian Runners	1158	807	36	64	55	41	41	52	79	90	103	72	45	0	678	2643	32

SECOND-YEAR DUCKS.

Owner, Breed, and Position.	First Year.	April.	May.	June.	July.	August.	Sept.	October.	Nov.	Dec.	January.	Feb.	March.	Second Year.	Grand Total.	Weight per doz. oz.
1. J. P. de Beyer : Indian Runners .	1245	65	55	63	96	95	107	160	149	125	88	59	60	1122	2367	32
2. J. A. Friend : Indian Runners . .	1210	52	46	79	88	98	126	150	145	117	111	66	54	1132	2342	30
3. D. Little : Indian Runners . .	1176	115	60	100	83	55	86	99	128	118	103	68	58	1073	2249	29
4. C. Kenny : Indian Runners . .	1120	80	41	53	59	105	136	151	130	108	73	45	40	1021	2141	32
5. G. Rogers : Indian Runners . .	1158	42	27	54	72	95	123	146	127	111	83	49	48	977	2135	31
6. G. E. O. Craft : White Runners .	1074	69	24	42	83	110	139	135	123	90	94	73	44	1026	2100	30

FIRST-YEAR DUCKS.

Owner, Breed, and Position.	April.	May.	June.	July.	August.	Sept.	October.	Nov.	Dec.	January.	Feb.	March.	Total.	Weight per doz. oz.
1. F. Morison : Indian Runners	53	149	167	149	150	156	148	145	156	135	100	93	1601	31
2. D. Little : Indian Runners	18	57	134	136	128	124	166	157	138	119	65	68	1310	30
3. G. E. O. Craft : White Runners	7	80	144	131	151	148	147	134	199	104	69	49	1283	30
4. St. Joseph's Farm : Indian Runners . . .	44	61	110	145	127	113	153	170	135	84	63	77	1282	32
5. G. Plowman : Indian Runners . . .	—	46	132	116	144	139	137	143	135	87	73	86	1238	30
6. Kapanui Yards : Indian Runners . .	16	50	125	133	139	130	161	156	135	97	62	40	1234	31
7. Morrison Bros. : Indian Runners	—	76	143	143	117	96	137	150	128	74	64	58	1186	31
8. J. Knoetzch : Indian Runners	—	47	84	101	128	116	131	145	133	87	84	32	1088	32
9. J. P. de Beyer : Indian Runners. . . .	41	58	49	100	84	91	139	146	115	68	66	66	1023	32
10. W. R. Williams : Indian Runners . . .	29	24	45	125	128	79	111	130	121	80	41	18	921	29

Eggs all the Year Round.—It has always been my contention that duck-keepers this side the Pond handle their ducks wrongly as regards egg-production. They aim at autumn rather than winter eggs, and it is difficult to trace the origin of this. Still, I think few experienced readers of this book will disagree with my contention. Far too many regard the duck as an autumn layer, relying upon it to bring in the eggs when the ordinary hens are moulting and therefore out of profit. From one view-point this is an advantage, because the duck-eggs are in season at a time when hen's eggs begin to drop off the market, so to speak, and so high prices are realized. Those who so handle their ducks (and it is the general practice), let them moult out late and do not expect eggs till early in the new year.

I want my readers to adopt a more progressive policy of forcing the ducks to moult late in the summer, say July and August, so that they will be in lay again by October or November and lay throughout the winter. In other words, let them handle their ducks just as they do their heavy-laying hens. Winter eggs are only possible under my scheme where the ducks are well fed for egg-production during the winter months, clover-meal, animal foods and heat-producing matter being included in the menu. In other words, feeding and management must be identical to that meted out to the laying hen. A study of the laying competition tables already given will show how well the ducks laid in the winter months, and in both New South Wales and Australia the late-summer moult is encouraged.

If autumn eggs are desired these can be arranged for by special hatchings, but the matter of winter eggs is deserving of the careful attention of all duck-keepers. We have reached that stage in the cult of the duck when more scientific handling, breeding and feeding should be the general rule rather than the exception. The person who will concentrate his efforts on heavy-laying ducks and will bring them to a high pitch of egg-efficiency like our pedigree strains of laying hens is assured of much good money.

CHAPTER II

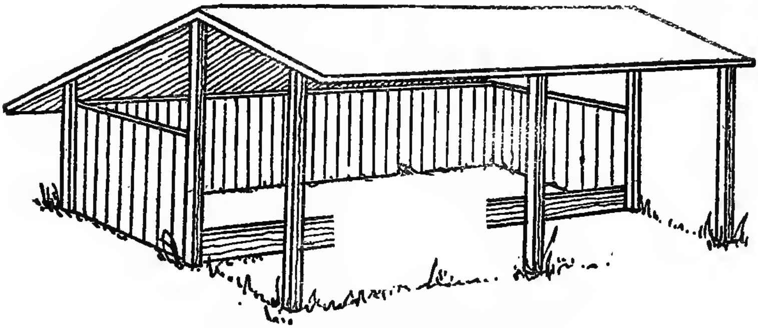
PRINCIPLES THAT GOVERN HOUSING

Ducks are Accommodating—Essentials in Housing—Breeding Stock—On Runs—Outbuildings—"Barrel" Structures—Permanent Quarters—Laying Stock—The Roof—The Floor—Bedding—To Keep out Rats—On Concrete—Cleanliness in Housing—Planning a Pond—Tarring—Limewashing—To Waterproof Calico.

ALTHOUGH the handling of ducks does not call for so much detailed work as that of laying hens the general principles governing their accommodation must be strictly followed if the best results are to be achieved. The principles are not so numerous as those for other livestock, so that the novice need experience little difficulty in the matter. The duck does not call for elaborate or expensive quarters so long as they are nice and dry, and well ventilated. In the following pages I deal with the whole subject generally and fully, so that each reader can play his or her own cards to the best advantage.

Ducks are Accommodating.—The duck is very accommodating and thrives in a moist climate such as we enjoy, or rather endure. Nor is this the only attribute in which it differs from the hen. First and foremost it is a " water " fowl, wearing a happy smile in rainy weather and revelling in even snow. Nor do they seem to dislike cold or frosty weather or cold winds, preferring to forage and to be out doing something in all weathers. They are therefore quite happy and contented in elements that would act seriously against the laying hen if on range. Nor does unfavourable weather seem to retard their egg-production unless there is a severe frost, which sometimes stops them laying for a day or two, but they quickly get to business again.

The duck is by nature weather-proof, having a thick undercoat of down in addition to a covering of feathers, and in the winter it is in consequence better off than biddy. Many duck-keepers arrange a covered-in shed attached to the ducks' quarters in which to confine the ducks during very unfavourable elements, but if the usual accommodation is reasonably roomy the ducks can be confined therein when they refuse to seek range. As a general rule the ducks are good judges, and if they show a desire to forage it is best to let them out. The duck is a knowing customer and far cleverer than biddy. It is in the winter in particular that good housing brings its reward by way of increased egg-production. Whilst their eggs may be forthcoming in plenty in the summer from ducks none too well housed, as they will from fowls so handled, a properly arranged structure is essential in the winter months if the ducks are to lay well and regularly. In the summer months ducks are very accommodating, and it is surprising what flimsy



USEFUL OUTDOOR SHELTER.

The sketch shows a useful duck-shelter for outdoor use and the design can be altered to fit one's objective. It forms a good shelter for ducks on range for summer use when built with thatched wattle hurdles. If constructed of sound timber and with the porch wired in the ducks can be confined therein in inclement weather in the winter, the low structure being attached to the sleeping house proper. The flooring can be bedded down and the roost and shelter can be connected by means of a small narrow "walk."

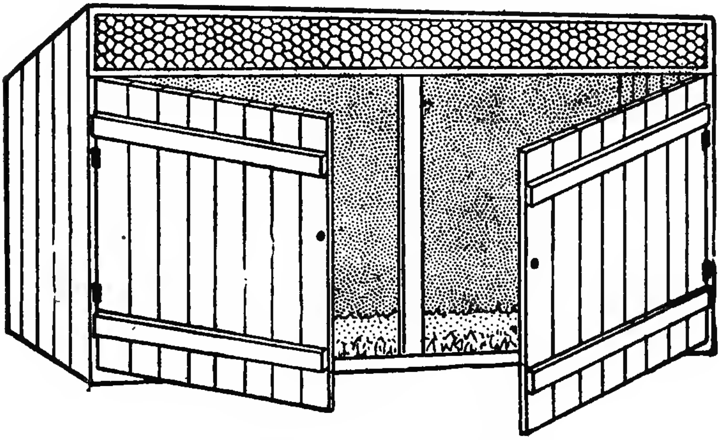
shelters they are content with. Often on close muggy nights they will refuse to enter their quarters, preferring to "squat" down in the grass enclosure. Many duck-keepers do not trouble to house their ducks in the summer, allowing them to sleep in a wired-in grass enclosure and to lay their eggs on the ground, which they readily do without any nesting material. Others use Λ-shaped wooden shelters or place two sheets of corrugated iron together in a similar manner. Not a few employ circular iron shelters, but unless the ducks are under lock and key they are open to attack from foxes, rats, etc. True, variety in housing methods is endless. On one farm I have in mind the breeding ducks have no houses in any season, merely sleeping and laying in a grass enclosure, and yet fertility averages 90 per cent. On another farm each set of breeding ducks has a large "barrel" as quarters for all seasons. In the summer fresh air within the house is a *sine qua non.*

One must of course bear in mind the object aimed at when selecting a type of house. If fertility is desired early in the season, to cater for the table duckling trade, then success depends upon good housing, quite as much as on handling. If one cares to go to the expense of an ornamental—exteriorly—house, that is quite in order so long as the interior is fitted out on common-sense lines. An ornamental structure in conjunction with a well-planned pond will naturally have a touch of "finish" about it.

Essentials in Housing.—Whilst the duck is protected against the unfavourable outer elements it must be well cared for when housed. The house must be well bedded, dry-roofed, dry- floored, well ventilated and light.

The type of house selected will depend upon whether an existing building is to be converted or if a special structure has to be erected, and whether the quarters are for a small breeding pen of ducks, a large breeding flock or a large laying flock. The height of the house is not a troublesome pointer because the convenience of the attendant is usually studied rather than that of the inmates. Low structures only 4 ft. at highest point are usually selected, but one can go to any desired measurements. Where the structure is 5 ft. or 6 ft. high there is this advantage, that cleaning out is facilitated.

Whatever the type of house selected, each duck should be allowed six or seven square feet of ground-space. Thus a house 6 ft. long by 6 ft. wide will accommodate five or six ducks, whilst one measuring 10 ft. square will quarter from fourteen to sixteen. We will first deal with a small house measuring 6 ft. by 6 ft., and say 5 ft. in front sloping to 4 ft. at the back. At the top (above the doors) of the front there should be a 6-inch deep ventilator going the whole distance of the house, this being covered with small-meshed wire-netting. Below this aperture for the whole depth there should be fitted two doors opening out on the coach-house principle. The back, roof and sides should be boarded in, and at the back near the roof there should be a perforated zinc-covered aperture two or three inches deep and the whole length of the house. It is wise to fit a wooden or glass hood (with solid ends) over the front ventilator to temper down the ingoing air and keep out the



SIMPLY CONSTRUCTED DUCK-HOUSE.

The "coach-house" type of doors will be noticed, inside which can be arranged wire-netting doors for summer use. Over the ventilator can be fitted a hood. (See text.)

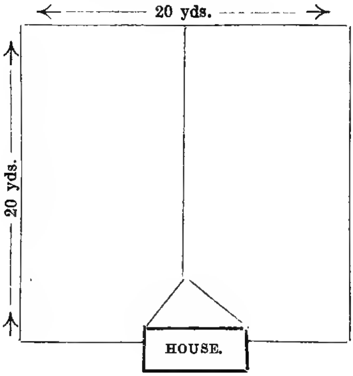
rain, and if it is hinged from the top it can be swung back when not in use to rest upon the roof, there being buttoned down. Inside the ordinary wooden doors should be arranged wire-netting covered ones, so that in the summer on warm stuffy nights the former can be left open (being securely fastened to posts let in the ground), whilst the latter remain closed to keep the ducks in. In like manner on days when it is not desired to let the ducks out the wire-netting doors only need be closed so long as canvas shutters are put into use to prevent the rain from beating in on the litter. The wire-netting doors can, if desired, be covered with coarse untreated canvas half-way up.

All that is necessary now is to bed down the floor after, of course, tarring the outside and whitewashing the interior. Many duck-keepers do not provide nests, allowing the ducks to drop their eggs on the bedding anywhere, which they readily do. I rather prefer to section off the two corners opposite the front by means of bricks and to fill in the recesses with litter, thus forming suitable nesting-places, although ducks are not fond of using same.

Such a house could be used for a small breeding pen of ducks or a few layers. If the birds were allowed range, no attached enclosure is absolutely necessary, although it would be an advantage to have such a run so that the birds could be assembled and confined therein prior to being shut up for the night or released in the morning. Ducks lay in the night or very early in the morning, and are usually ready to be let out by 9 o'clock. If it is thought that many are laying when out at range they can be confined to their enclosure till 10 a.m. till those that are ready have laid. That is another advantage of an "assembly" run into which the ducks can be released if desired early in the morning, so that they will not be "cooped" in their sleeping houses till let out on range. The "assembly" arranged round the house need not be a commodious affair. Periodically one should take a stroll across the field or land where the ducks travel after being released. If any eggs are found on the ground either near the house or far afield the ducks can be kept in their enclosure a little later.

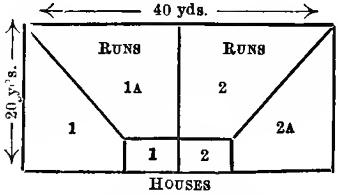
Ducks of all ages require ample shade from the hot rays of the sun mainly because their skulls are so thin. Pasture combined with woodland will make ideal range, as the trees will provide the necessary shade. In the runs bushes, shrubs or fruit trees should be planted to afford protection, and in enclosures or on range rough movable day-shelters can be erected to advantage. Water-proofed calico can be stretched across a low hurdle framework, the ends being open, such structures being dotted here and there. But it matters little what design of shelter is provided so long as the main object is achieved. Where a large flock of breeding ducks is kept in an enclosure a commodious shelter constructed from wattled hurdles and covered with water-proofed calico or some such material will provide shade and shelter to a nicety; all such structures should be movable and no flooring is necessary where they are used only in the summer.

Breeding Stock.—It is customary to run breeding stock in small pens of four or five ducks to each drake, allowing each pen an attached enclosure or run. Such a house as I have described can be placed within each run, or there can be several such houses built under one continuous roof to take the various sets of breeders. For a pen of five or six birds a grass run measuring 20 yards square is recommended, and this should be divided down the centre to

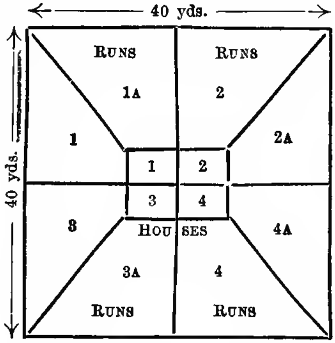


allow for one-half being rested for a time whilst the other is in use. Near the house the centre partition can end with a low swing gate which can be fastened to either end of the house according to the run into which the ducks are to go after leaving the structure. Dual runs are strongly recommended.

If several such houses are built under one roof they need be sectioned off inside only by wire-netting some 2 feet or 2½ feet high, or match-boarding to the same height. And many plans of grouping the runs where such continuous housing is adopted are possible. Below will be found two methods. One plan shows two breeding houses, and dual runs to each. The other sketch depicts a set of four breeding pens, each also with dual enclosures.



Personally, if I were running small breeding pens of four or five ducks and a drake I should plan the houses in pairs or in fours; in



the latter case a span-roofed structure could be selected, the dividing partitions being 2 feet or 2½ feet wire-netting.

In addition I might run several flocks of breeding stock, each consisting of twenty-fives, say twenty-one ducks and four drakes. Drakes do not "scrap" like cocks when placed at the head of a flock of females, and under this plan one drake can be run to each five or six females early in the season, and to each seven or eight later on. In Runners one drake will manage in a flock up to ten ducks. Each flock of twenty-five can have a grass enclosure 30 yards square, this being divided into two, so that one-half can be rested whilst the other is in use.

At the bottom of each run a small water-bath can be let into the ground if desired, although it is not essential. Where a goodly number of breeders are kept one can if desired arrange a special enclosure at the bottom wherein can be fitted up a fair-sized pond. The various pens of ducks can take it in turns in being let out into such an enclosure during the day for a spin and a swim. One might, too, be able to provide free range, in which case the pens can take their daily turns out foraging. My aim has been to touch upon the subject in a clear way so that the duck-keeper can arrange his plans just as his environment dictates.

A house 13 ft. square will accommodate a flock of twenty-five breeders, and it can be built on larger lines to the model I have described, or there can be a glass window on either side of the two 3 feet "coach-house" doors.

As regards the runs 2 feet deep wire-netting is sufficient for the divisions, and fertility will be aided if the outer divisions are represented by wattled hurdles to check the ground winds. Match-boarding can be used if desired, as can corrugated iron or tarred canvas tacked over the netting. Such solid partitions also provide a little shade. Within all enclosures there should be trees or bushes to provide shade, as this is essential to success with both young and adult ducks. That is why an orchard is so useful.

Where several breeding pens of ducks are quartered under one roof it is an advantage to have a 3 feet or 4 feet walk down the centre of the building. The outer runs can be arranged on both sides of the span-roofed structure, and the divisions inside the house can consist of wire-netting, creosoted or tarred wood, or concrete about 2 feet or so high. The operator can step over these when cleaning out the sections, and can tip the material into the barrow as it stands in the centre walk.

On Runs.—Ducks are free-manurers of ground, a point that must not be overlooked. Where the extent of the land available allows, the houses can be built in sections so that they can be removed to fresh sites as desired. In such cases it will be quite an easy matter to move the low netting forming the enclosures. Where the run is to be kept in grass it must be roomy, and dual enclosures must be adopted for each house, so that one can be rested whilst the other is in use. Where ducks are confined they have a tendency not to forage and grass soon disappears off a small patch. The provision of a swimming bath will encourage the ducks to roam over their enclosures if the water is located at the bottom of the run.

Many do not trouble to keep their runs in grass, but adopt the dual runs, resting one whilst it is being cropped. This plan enables the duck-keeper to dig up the run that is being rested, and to grow a crop after the soil has been limed. Each enclosure can be used for six months, and each can carry a crop during the same period whilst it is being rested. Thousand-headed kale is a good crop to grow, but it matters little what is grown in the greenery line, as the foodstuff produced can be used for the ducks. The latter require greenery *ad lib.*, and where the runs are small provision must be made for the growing of green crops, which can be cut and fed to the ducks. Liming ripens the manurial properties in the droppings, and a crop sweetens the soil. The ducks can if desired be allowed the use of any run down to crops after the latter are up a little. Rape, lucerne, oats, maize, barley, mustard, vetches or rye can be grown in runs being rested.

Grass runs that are resting can be treated with basic slag, lime or ground chalk every autumn, and this will bring out the finer grasses and clover.

Outbuildings.—Where the farmer keeps ducks he may decide to hand over to them one of the outbuildings, particularly if he possesses a large laying flock. Such disused buildings come in very useful as accommodation, the floors being well bedded down and proper ventilation and lighting arrangements being installed. As a rule outbuildings, unless of modern pattern, are dark and badly ventilated, which weaknesses must be strengthened. A glass window will admit the light, and above the door for the whole length of the building can be fitted a wire-netting ventilator some 6 inches deep. Ventilation arrangements will also be necessary in the back wall, to allow for ingress and egress of air.

I have often seen a pigsty converted into a serviceable duck-house. If the flooring of the sty consists of bricks, cement or concrete it is all the better if a wooden sparred floor is placed on it, the bedding being put over this. Failing this, the solid floor must be deeply bedded down. In some sties the run-through from outer run to sty is not controlled, in which case it is advisable to fit up a wooden door. If inside the latter a wire-netting door is fixed, this can be closed at night in the summer whilst the wooden one is left open. The pigsty must of course be well ventilated.

I am not in favour of ordinary pop-holes in duck-houses, as ducks will not go quietly like hens through such small apertures. Far better is it to have a door that swings wide open, and in an outbuilding large double doors after the "coach-house" style are ideal. They can be left open in the day to give the quarters an airing, but all doors should be securely fastened when open to prevent them from swinging to and crushing any ducks or ducklings.

"Barrel" Structures.—If a few ducks only are kept they can be made very "comfy" in even a barrel turned on its side and prevented from rolling over by means of bricks. I have in mind very many cases where such accommodation is all that is provided throughout the year for trios, quartets or quintets of breeding ducks, and with excellent results. The usual plan is to fit a door to such an accommodation, letting the ducks have free range and incubating their eggs to provide the ducklings to fatten for the table. Such an accommodation could be used in an orchard to advantage, and would under the same circumstances be very serviceable for ducklings undergoing a course of fattening. There are barrels and barrels, and size should govern the number of ducks the appliance is to shelter. A large packing case can be converted into a suitable duck-house, and this is often the case.

It matters little what kind of erection is commandeered or put into use so long as it keeps the inmates dry overhead and under foot, is light and well ventilated. In the case of a " barrel " structure the top can be tarred and felted, whilst the door in the front can be hinged to open wide, as pop-holes are not desirable for ducks. Towards the top of the door a narrow depth of perforated zinc should be fitted for ventilation purposes, a similar arrangement being also allowed for in the back at the highest point. If these apertures are controlled by a sliding glass shutter this will be an advantage. If a removable flooring consisting of thick timber or battens is placed within the barrel and the litter on top, such a fitting can be readily taken out and the interior cleaned.

Permanent Quarters.—Where the quarters are for permanent use and where "tenants' fixtures" are not concerned a concrete foundation to both house and run has its many advantages. The house can be erected on a bed of concrete, whereas the run, or part of it, can consist of concrete, the whole having a gentle slope for draining purposes. Where this is adopted a swimming bath can be planned, and the whole can be regularly swilled and brushed down and disinfected with Izal. A channel can be arranged on one side and at the bottom to carry the water away.

If so desired only a small piece of ground near the house need be of concrete. The house can be of concrete also, or it can be a wooden structure mounted on a low brick or concrete wall.

Laying Stock.—Where ducks are kept solely for laying they can be run in large flocks up to fifty each, and be housed in outbuildings or specially erected continuous laying houses. The latter should not exceed 16 ft. in depth if specially built, longer structures being better than deeper ones within reason. Such ducks can be given free range, and if a wired-in enclosure is provided it will be useful as an assembly place wherein the ducks can be confined prior to their being shut up for the night in their houses, and before they are released to forage in the morning.

The Roof.—A rain-proof roof is a *sine qua non*. If wood is used let it be of a nice thickness and fit thereover roofing felt, afterwards tarring the latter and adding a sprinkling of sand over the sticky surface. Over the felt nail—downwards—narrow laths to prevent the wind from stripping off the material. At the back and front let the roof project, and if there is a spouting arrangement to carry off the rainwater so much the better in the case of large structures. A V-shaped wooden trough that has been well tarred inside and out will make a serviceable guttering.

Corrugated iron has its drawback when used alone, being too hot in the summer and too cold in the winter. If underneath it there is a second light wooden roof with the space between packed with straw, shavings or paper, this ensures an even temperature within the house, but there is the additional cost. If corrugated iron alone is used it should be whitewashed on the under part during the summer, and it is more firmly held if screwed instead of nailed on.

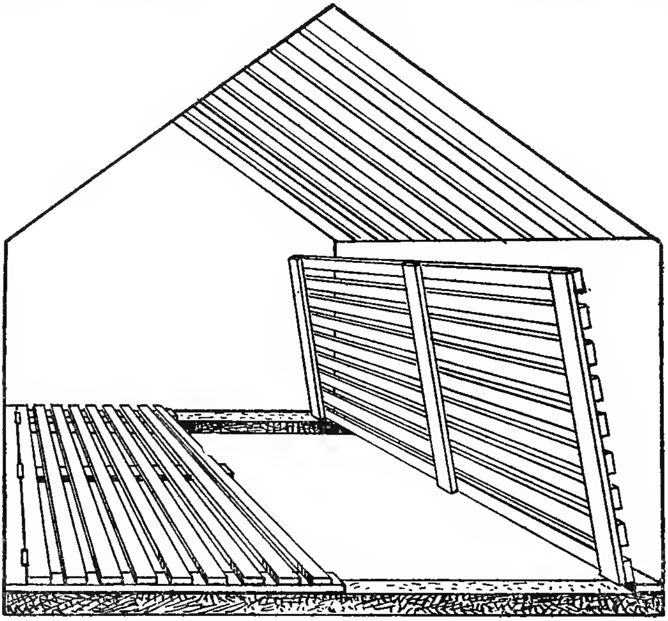
Tiles, slates, concrete or thatch can all be used for roofs, and over thatching of several inches deep corrugated sheets can, if desired, be fixed. A rough roof can be prepared by means of wattled hurdles over which are placed furze or bracken and a top thatch.

When selecting the material for a roof bear in mind to what uses the house is to be put. If it is only a movable structure for summer it will not call for so much attention as an erection that is to be employed permanently on the same spot.

The Floor.—We must guard against two things when erecting the floor, viz. dampness and rats. A wooden floor raised off the floor on tarred bricks, or supports, will be damp- and rat-proof, and the bottom should be well tarred. When the flooring is so raised, a wide wooden platform with strips of wood nailed across 2 inches or so apart to prevent slipping is to be recommended. This gangway should have a very gentle slope, and go the whole length of the doors. When not in use it can be pushed under the house or hung within the latter, or it can be kept always in its place. It is harmful to compel ducks to waddle up a very steep platform, or to make them " bundle " through narrow pop-holes. A cement platform with stepping pieces can be used if desired. The wood used for the flooring should be tongued and grooved and be tightly braced underneath by means of battens. The house, too, should stand for preference on high ground where the drainage will be away from and not towards the structure, and whilst the flooring should be tarred below it should be creosoted above.

Ordinary soil can be used as the flooring if the site is dry, but if heavy clay is present this must be removed to a good depth, and be replaced with other soil or the raised wooden flooring must be adopted. If the earth is dry the bedding to a nice depth can be placed on top, and the top surface of the soil can be removed once or twice a year and be replaced by a fresh supply. A good flooring can be made by ramming down broken bricks and clinkers that have first been tarred. Smaller pieces can be scattered on the top when tar and pitch can be poured over the whole until a level surface is obtained. Such a flooring can easily be brushed over at cleaning time, and the bedding can be placed on the top. Where earth is used a dry foundation is essential, and this can if desired be arrived at as follows : remove the top soil to the depth of a foot, ram down broken bricks and clinkers and replace the earth. Another plan is to dig a trench round the base of the structure—a foot deep and several inches wide—and fill it with creosote or tar.

Many adopt concrete or cement floors if the structures are to be permanent ones, and often one finds a concrete flooring in the outhouse it is decided to utilize for the ducks. Concrete is hard and cold, and to counteract these drawbacks a liberal bedding must be employed on top. If one cares to go to the expense slats of stout wood—well tarred—can be fitted over the concrete flooring and the bedding put on this. The wooden spars can measure about 4 inches wide, and should be nailed about an inch apart on stout cross battens. They must run the whole length and width of the ordinary flooring, off which they will be raised 2 or 3 inches. The sparred bench can rest on a shallow concrete wall arranged at each end of the house. The concrete flooring can have a gentle slope towards the rear of the house to an outlet for the moisture from the droppings, and the space between can be filled with earth. If the sparred bench is divided into two or three sections and hinged, same can be swung open to facilitate cleaning operations when the house is given a thorough clean out. When down the sections can be bolted; when up they can be chained.



Sparred Bench in Duck-house.

Interior of duck-house showing sparred bench raised off the ordinary concrete flooring. One-half of the bench is shown in position and the other raised for cleaning purposes. (See text.)

Brick floors absorb the moisture which penetrates the joints and throws back an offensive smell. The cracks are best filled with cement, or the bricks can be covered lightly with a cement and lime (in equal parts) solution, and the surface smoothed over to present a gentle slope for draining purposes. Tarred clinkers or broken bricks can be treated in the same way, and sometimes concrete is given a thin top covering of cement. Over such floorings the wooden bench can be fitted, the spars being well tarred or creosoted and treated regularly with preservative. Where such material is used the surface can be swilled, brushed down, and disinfected with Izal wash regularly, which is a great advantage.

Where a wooden floor is used rough roofing felt can be tarred and nailed over it, the felt being then covered with a thin layer of cement and lime (equal parts) to produce a dry smooth surface that can be easily cleaned. The bedding is then added.

Bedding.—As the ducks have to "squat" down when "roosting," their feet need protection to avoid cramp—roup does not trouble the duck. A nice dry bedding to the floor is therefore essential, and it should be of a good depth. If this is attended to the ducks can go to bed in the wettest weather straight off the range, and yet come to no harm. Peat moss litter, cedar clippings, bracken, dried leaves, straw, etc., are all in common use as bedding. The litter must be kept dry, and the deeper it is the better. Soiled portions can be removed daily, and the rest tossed or shaken up, fresh litter being added as required to fill up the gaps. Occasionally the whole can be removed and replenished. At one time straw was commonly employed as bedding, but peat moss litter is now extensively adopted. Many have a foundation of dry sand, and place on top a good depth of bracken or dried leaves. Whatever material is used, the main thing is to keep it dry and to let there be plenty of it.

Litter should be well cared for, and if a brush and scraper are kept outside the house the owner can remove the mud from his boots ere entering the structure in wet weather. Mud will not then be unnecessarily deposited on the bedding. When the bedding is raked plenty should be placed round the sides of the house, as ducks have a tendency to spread out round the edges.

Ducks suffer from cold feet; hence the importance of dry and ample bedding.

To Keep out Rats.—If the duck-house is built of concrete or has a concrete or brick foundation, rats will not give much trouble. Nor will they if the houses are raised off the ground and provided with wooden floors. In all cases, however, must the doors be securely fastened at night. Where there is an earthen floor a good plan is to build a trench about a foot or more deep and 9 inches across around the outer walls of both house and run and fill it up with cement and broken bottles. This barrier can be continued a little up the sides of the structure so as to taper gradually to a fine point. The trench can, if desired, be filled with tar, concrete, broken bricks and tar, cement or creosote. Another good plan is to drop tarred wire-netting deep into the ground outside the house and to sink bricks to a good depth directly inside the structure, i.e. around the walls. Many merely sink tarred wire-netting deep under the ordinary soil, bringing it up to the outside of the walls of the house.

Rats will be encouraged if food is left about in the run or in the food-house. In the latter scrupulous cleanliness should be observed and all bins should be tarred halfway up and be provided with covers which should be kept in place when the receptacles are not in use.

Rats must be strictly guarded against or they will steal the eggs and kill the young ducklings, whilst they will attack and often kill adult ducks. Take steps to clear them out. The duckling is a dainty dish for the rat, which will carry one off at night right from under the mother-hen. If you miss ducklings, suspect rats and take the necessary precautions. See that all ducklings are securely locked up for the night before you retire.

Block up all rat-holes with a mixture of cement and broken glass, and attend regularly to this duty. Even though the rats may not attack the adult ducks their presence in the house, bent on egg-stealing, will frighten the inmates. And sudden frights are harmful to ducks of all ages.

On Concrete.—Here is a good recipe for concrete: One part cement, three parts sand and five parts aggregate or "filler." As the latter I prefer ordinary bricks and clinkers broken up into small pieces, and the sand should be coarse and sharp. Mix the ingredients on a suitable mixing-board, and pour over the whole whilst it is being raked and shovelled sufficient water for the materials to absorb it without any running away. Cleanliness is essential in all operations. The mixing-board, cement and aggregate should be clean, any dirt or rubbish being removed from the "filler." The broken bricks, clinker, slag or coke breeze forming the latter should be small enough to pass through a 1-inch sieve, and the ingredients should be watered through a fine rose. Use the concrete directly it is made and prepare at a time only the amount required.

If one is erecting a concrete wall a foundation-trench must be dug at least 4 inches wider than the thickness of the wall, and it should go 2 feet or so into the ground. The wall must stand on a dry foundation, and at the bottom of the trench clinkers or broken bricks should be rammed down tightly, a drainpipe being fitted in the material if moisture is suspected to carry off the surplus water. The wall should start about 18 inches under the ground.

A framework must be nailed up to receive the softened concrete, stout timber being used for the boxing arrangement. With the guiding boards bolted or securely fastened the right distance apart pour in the concrete and well ram it down, the latter process being necessary each time concrete is poured in. After three or four days the boards can be removed, and after a fortnight the whole should be well set. Barbed wire can be interlaced within the concrete when the latter is poured into the wooden framework to make the wall more secure. The walls can be four inches thick.

The roof of the duck-house can also be of concrete, or it can consist of timber with felt as the top covering. Concrete houses are expensive, but they are rat-proof and everlasting. The divisions within the house, if a continuous structure, can also be concrete.

Cleanliness in Housing.—Clean housing will go far to help the duck-keeper to meet with success. The flooring and bedding must be kept dry, as I have stated, and on no account should the litter be dirty, damp or mouldy. With the droppings removed daily, soiled bedding removed and the rest of the litter shaken up this will promote clean surroundings. Where an earthen floor is adopted for the duck-house the top surface to a depth of 6 inches or so should be removed once or even twice yearly, and be replaced by fresh soil. Having removed the top soil well water that underneath with a strong Izal disinfectant wash. Sand or gravel can be used as the top layer if desired to, say, a depth of 6 inches. This can be removed and "heaped" in the open, a fresh supply replacing it within the house after the lower ground has been disinfected with Izal. Whilst heaped in the open the sand or gravel can be saturated with the Izal disinfectant, and be left there to "rest." The rain will cleanse it, and by the time the top layer inside the house has to be removed this "rested" material can again be used to take its place. And the used material can in turn be "rested" in the open for, say, six months, being disinfected with Izal as previously advised. By this plan the same material can be used over and over again, so long as it is properly cleansed whilst standing in the open and laid out to dry prior to being used once more.

In the spring the houses should be cleaned out for the summer, and in the autumn the procedure should be repeated ready for the winter. The structures should be overhauled and repaired in the autumn, and in the summer tarring and limewashing should be attended to.

The interior walls can be lightly sprayed each month with a weak Izal disinfectant wash, as can the bedding.

When erecting a house tar, creosote or paint the tongues and grooves of matchboarding to prevent them from rotting, and tar the end of each upright—after charring it—when placed in the ground. Again, where possible, bolt or screw the sections rather than nail them, and nail matchboarding downwards to run off the rain. If cracks in the houses appear cover them on the inside with several pieces of tarred brown paper. Prior to whitewashing remove all the bedding, close up all the apertures and fumigate the interior, placing a bucket of brown paper in the centre of the house and setting light to the material. Or use a sulphur candle. At the close of the season store under cover all rearing appliances, after scrubbing them out with warm water and Izal disinfectant soap and thoroughly drying them. Before use the next season whitewash the interiors.

Planning a Pond.—As I have said, swimming water is not absolutely necessary for ducks that are on grass, although for breeding stock (except the " land " breeds like the Runner) it is an aid to fertility. By encouraging exercise, too, it keeps the breeders in a fit condition. Growing and exhibition stock will benefit by having swimming water, but ducklings being fattened for table should not be allowed to take swimming exercise, or they will not make the best weights. They only need a swim prior to being killed just to clean their feathers.

There are ponds and apologies for ponds. Some sink an ordinary tub—well tarred—into the ground and fill it with water, others a galvanized iron cistern with a plug at the bottom to let off the water into the ground or down a pipe into a receptacle for removal. Where such a plan is adopted, the bath can be cleaned out. For a small bath 6 feet by 3 feet 6 inches are suitable measurements, and it can be some 18 inches or so deep.

In the case of a small bath a good idea is to secure two barrels, one a third deeper than the other. The smaller one must fit in the other tightly. Having removed the bottom from the larger barrel sink it into the ground, and arrange a bunghole in the smaller one prior to fitting it in the deeper receptacle. Now fit a wedge in the bunghole and fill the smaller barrel with water. When it is desired to empty the barrel remove the plug or wedge and the water will escape through the ground; meanwhile add fresh water. The barrels should be flush with the ground.

If it is decided to construct a pond, dig a hole about 2 feet deep and of the required dimensions, well stamp down the earth and cement the bottom and sides or use bricks instead. One end should have a gradual slope, so that the ducks can easily enter and leave the water, although there can be a slope at each end to advantage. The water should be renewed as desired, and when the pond is empty the walls and bottom should be well scrubbed.

Many construct the pond in the cement run, in which case it must be higher than the surrounding ground so that the swillings will not run into the water. It is always advisable to arrange the house a goodly distance from the swimming water, whether the latter be a natural stream or an artificial pond. The ducks will then shake themselves dry ere reaching their quarters. It is a mistake to place the duck-house on the bank near a stream, as is so often seen, or the bedding will be continually wet.

If it is decided to construct an artificial pond, it is well to study environment and the head of ducks kept. If the quarters are permanent and continuous small houses and runs are in use, it might be advisable to have a large pond at the bottom arranged in a wire-netting enclosure and with the surrounding ground consisting of cement or concrete. Each run would open out into same, so that the pens of ducks could take it in turns in having a swim during the day. Failing this, a small pond can be planned at the bottom of each run, whether the latter is of earth or cement.

Many readers may like to plan an ornamental pond of reasonable dimensions in order that they may watch the ducks disporting themselves in the water. Such a pond might be arranged near the homestead, and would naturally represent a charming scene. If wire-netting 2 feet deep was erected round the pond 3 feet from the edge this would keep the ducks in bounds, and they could gain access to the water from their quarters down a narrow walk—grass or gravel—with a wire-netting fencing on each side. A round shape would be preferable if the pond is of any size, and there should be two landing places (with a gentle slope) opposite each other. In order to provide shade an island or two planted with shrubs will be necessary, but these should be arranged near the edge of the pond so that the owner can walk thereon and drive the ducks off if such a procedure is necessary. Where an island is located in the centre of the pond it certainly looks very attractive, but the ducks will squat thereon and refuse to budge at a time when the owner wishes to lock them up for the night. And if the pond was very wide the owner would be helpless unless a boat was handy. An ornamental fountain can be arranged in the centre.

For a very large pond a depth of 18 inches or more is desirable, and below this depth an 8-inch lining of concrete is usually planned. The concrete often consists of one part cement to nine parts coarse, clean sand or fine gravel, the mixture being spread evenly over the bottom and sides and well rammed, and the ground is also smoothed and rammed firm ere the concrete is applied. When the mixture has set a ½-inch or 1-inch surface of cement and clean sand in equal parts can be added to advantage, and when set cement wash made by mixing cement with water to a consistency of whitewash can be freely applied with the aid of a broad whitewash brush.

The duck-keeper must use his own resources in filling and emptying the pond. A supply of water may be tapped from a natural stream, well, or the public supply passing through a 1-inch or 1¼-inch pipe into the pond. This pipe must be provided with a shut-off cock and can be fitted near the concrete bottom or at the side of the pond.

As regards the emptying of the pond there should be fitted up at the time the concrete is laid a cesspool measuring 10 inches by 10 inches by 20 inches, and covered by a grating. A cast-iron or earthenware piping 3 or 4 inches in diameter should link up with the cesspool and be continued to the spot where the water is to flow away. Before the terminus is reached, however, a gate-valve must be inserted in the pipe and be operated by a key. The pipe can be connected with the sewer or be terminated in sandy soil.

The bottom of concrete must of course slope from every direction towards the cesspool, so that when the gate-valve is opened the pond can be completely emptied. The sides and bottom can then be flushed with a hose.

If a stream is handy and the ducks show a tendency to swim away and to remain on the " missing " list, laying eggs for other people to gather, make an excavation in the bank to trap the water and fence it off so that the ducks can be confined. Such a plan might be adopted until the birds become acclimatized, when they would not give trouble from " wandering." Still I am writing of exceptional cases.

It is a mistaken idea that ducks must " live " on the water. There should be land within the enclosure and adjacent to the pond, so that the ducks can " mix " it just as they desire.

Tarring.—If the house is to be tarred select a fine day for the operations. There are innumerable recipes, but I like the following: Boil a mixture of 3 lb. of pitch to each gallon of creosote oil over a " brick " fire until the pitch has melted, and if necessary thin down with a little water. When thoroughly boiling it is ready for use, and to keep it warm and of the right consistency drop a red hot brick into the bucket containing the mixture. The brick can be readily handled if attached to a length of stout wire. When tarring the roof use a water-can with the spout flattened out until only a thin narrow aperture remains. Start pouring on the tar at the highest point of the roof.

Whilst some merely creosote the exterior of houses others use paint for a coat. There is nothing to beat tar, and once this arrives at a good thickness it has to be worn out ere the wood itself is attacked. It gives a second wall to a structure.

Limewashing.—The interior of the duck-house should be limewashed, and a good recipe consists of 10 lb. of lime, 3 lb. of soft soap and 1 quart of paraffin. Place the ingredients in a tub, pour over about three gallons of water, and then place a coarse sack over the top of the receptacle to retain the heat. Stir the mixture a little time after, and having taken out a bucketful of the lime-putty thin down with boiling water. When strained it is ready for use. Before adding the paraffin mix it with an equal quantity of boiled milk to prevent the paraffin from swimming on top.

Another plan is to put several lumps of quicklime into a bucket, pour over boiling water to slake it and in the process, whilst very hot, stir in about 1 lb. of flowers of sulphur and one quart (to a bucketful) of an equal mixture of paraffin and linseed oil.

Prior to limewashing well clean down the walls, and apply the mixture hot as it is then more adhesive. Use a well-worn whitewash brush to apply the mixture or a spraying machine. With the latter all crevices can be attended to. A little Izal disinfectant fluid added to the limewash is strongly recommended.

Creosote and distemper are also used for interiors, but I like the old-fashioned limewash.

To Waterproof Calico.—Ducks of all ages need ample shade, and this can in many cases be provided by means of waterproofed calico. If the latter is needed to cover apertures in order to temper down the ingoing air it must be untreated.

To waterproof unbleached calico take 3 quarts of linseed oil, 6 ounces of resin and 2 ounces of sugar of lead. Grind the lead with a little oil, then add the rest of the oil and also the resin. Place the whole in a pot over a gentle fire, and stir well. Stretch the calico taut, and having nailed it to the framework apply the hot mixture with a brush. Another plan is to treat the unbleached calico with two coats of boiled linseed oil, a teaspoonful of terebine being added to each quart.

If it is desired to waterproof the calico and at the same time to make it impervious to light take 1 lb. of tallow candles and

1 gallon of Stockholm tar, well heat together and apply hot to the calico.

If ventilation is desired through the calico, the latter must be of the coarse, openly-woven kind and must be untreated. It must, too, be regularly brushed to prevent the dust from clogging the holes. Waterproofed calico allows the light to penetrate through but keeps out fresh air. Select a fine day for the waterproofing work, and let the calico stand out for at least twenty-four hours to get properly treated and dry.

CHAPTER III

BREEDING ON PROGRESSIVE LINES

Females per Male—The Best Mating—Management of Breeders—Breeding for Flesh—Breeding First Crosses—Laying and Breeding—Breeding for Eggs—Pedigree Breeding—Opportunities in Duck Breeding—On Trap Nesting—Egg Recording—Marking the Ducklings—Breeding Records—Eggs versus Ducklings—Early-hatched Drakes—Quality Tells—Selective Breeding—Establishing a Laying Strain—Should Pedigree Strains be Registered ?—Against trap-nesting.

NO matter what kind of livestock is kept success cannot be achieved if progressive methods of breeding are not adopted. The utility duck, of all members of the livestock fraternity, is and has been bred least on systematic lines. This is probably due to the fact that the sterling laying merits of the duck have not been fully recognized. The tide is, however, turning !

Much of the matter in this chapter will be new to the duck-keeper, for the very reason that for too long has he plodded on in the same groove. I have endeavoured by means of this chapter to help him out of the rut so that he will try the more progressive methods recommended. His increased egg-return will prove the wisdom of my systems ! I have treated the subject as far as possible from all view-points.

Females per Male.—The number of females to place with each drake will depend upon (1) season, (2) breed and (3) age and condition of the male. A young vigorous drake will naturally be able to care for more ducks than an old one, and at the same time will produce hardier and more vigorous ducklings. Again a healthy young drake that has romped ahead from the start will prove a more reliable breeder than an out-of-condition or immatured male. One can often be guided by the condition of the breeding ducks. If the feathers on the necks of the latter are much worn undermating may be suspected and further females should be added. Should the point raised be experienced with a large flock of breeders the males can be reduced if the owner does not possess additional females.

As a general rule it is customary very early in the season to mate three or four ducks to a drake, but from April onwards from five to seven females will not be too many, if the male is vigorous and in good condition. For the Pekin type of duck three to seven females would be the rule throughout the season, but for the Runner any number up to twelve might prove satisfactory.

As stated elsewhere, several drakes can be run at the head of a flock of ducks without any quarrelling among either sex, which is a real advantage and one not present with most members of the livestock fraternity. Early in the season flocks up to twenty or twenty-five can have one male in attendance to each five or six ducks, and later on one to every seven or eight. One must go by fertility results, adding extra females or a further male accordingly should the eggs produced not give entire satisfaction as regards hatching. If swimming water is provided, less drakes will be required in a flock than where it is not included.

The Best Mating.—The best mating as regards ages of the parent stock will depend to a great extent on environment and the object in view. As I have stated, maturity will vary from, say, five to nine months with the light-weights having the advantage, and males will be in breeding condition at from six to ten months.

The best mating for vigour is, in my opinion, a young eight to ten months old drake to two-year-old females. The latter have many real advantages over young ducks, and for early hatching a young vigorous male is hard to beat for the best results as regards fertility. The next best mating is a two-year-old drake to matured first-season ducks, followed by matured females mated to a vigorous male several months their senior.

There are drawbacks, however, that I must mention for the very reason that each reader must map out his plans according to his individual surroundings. Ducks when kept in confined enclosures of small dimensions are prone to lay on fat with age, and that is a disadvantage we have to face when mating two-year-old females to a young male. Where the ducks have free range the exercise obtained will counteract the drawback I have mentioned, as too will heavy laying, careful feeding and swimming exercise. The person who is keeping but a small head of ducks will find it more profitable perhaps to run them as a flock headed by several males, allowing free range to promote breeding condition. I refer, of course, to the duck-keeper, who can give ample range for foraging and exercise.

An alternative plan where the ducks are quartered in small breeding enclosures is to have a nice-sized pond at the bottom of the runs for general use, each set of ducks taking turns with the swimming exercise. Or free range might be allowed for the pens in turn, whilst if one cared to go to the expense and the results warranted it each enclosure might boast of its duck-pond. Again, with the breeding ducks kept in flocks each up to twenty or twenty-five or thereabouts, each set could have a pond and be allowed range in turns. The light-weights will not give the same trouble in the direction indicated as the heavy breeds. I mention the matter, however, for the guidance of my readers. Of the two equal-age matings, viz. young drakes to young ducks and adult drakes to adult ducks, the latter is preferable.

Management of Breeders.—The feeding of breeding ducks must be totally different to that of ducklings being raised for the table. The diet should be well balanced, and fattening foodstuffs fed with great care. Heavy-laying ducks and those on free range have opportunities to "melt" down surplus inward fat; not so the breeding duck if she is kept in a small enclosure without range or a pond. Small and irregularly-shaped eggs often denote a fattening diet, and things can only be rectified by a treatment of Glauber's salt in the drinking water, a change of diet and free range. Internal fat attacks all the organs within the duck, and is not noticed by a cursory glance as there is no outward appearance of a surfeit of fat. The liver is attacked and may give way, the walls of the oviduct may be pressed in by the solid rolls of fat thereby causing small and misshapen eggs, and the heart or brain may give way, causing death. It is well then to feed breeding ducks on common-sense lines, and to give them fat-producing foods with care, both in moderation and only frequently. In inclement weather a little of heat- or fat-producing foodstuffs will do good to balance the strain on the system, but that does not mean that breeders should be fed day in and day out on potatoes or barley-meal. Use discretion in all things. Overfat birds, too, will produce unfertile eggs in the main. Nor must undue force-feeding be practised with parent stock.

Breeding for Flesh.—The finished product must necessarily carry weight when selecting breeding stock. If the duck-keeper is breeding for flesh he must first of all decide upon a suitable breed that will give him the exact material he wants. And he must next choose parent stock in that breed that will also supply the desired material in relation to the finished article. It is useless to expect, generally speaking, weighty, early-to-market ducklings from small parents. The latter, to give the best results, must themselves be large and well-moulded, and yet at the same time they should be active despite their heaviness. There is a lot of difference between a heavy-framed duck and a "fat" one, which distinction must be allowed for when selecting the "table" breeders.

Detail work will always score heavily in breeding, and all ducklings raised for the table should be weighed regularly. Increases can thus be noted, and valuable data obtained as regards not only fattening methods but also those of mating. Certain drakes will excel over others in throwing heavy early-to-market ducklings and they should be maintained within the strain. The heaviest duckling in the shortest time is the ideal, and all points leading up to our objective must be fostered and improved within the strain.

A note of warning is necessary! The majority who breed table stock think that methodical breeding is not necessary, being under the false impression that any matings will do. It is not sufficient if the best results are to be achieved. The antecedents of each parent should be known, or the services of many excellent ducks will be passed over. A duck may be medium in size and yet bred from large parents; such a large-bred medium specimen must be preferred to a small-bred under-sized one, because the former will probably throw big-framed progeny on account of its antecedents. When breeding even table specimens believe me you cannot afford to neglect methodical breeding and the keeping of strict accounts not only of the parent stock's antecedents but also of the rearability of their progeny.

Breeding First-crosses.—Many cross two breeds in an endeavour to secure suitable material for their particular object. The Aylesbury, for instance, is often crossed with the Pekin for table purposes, and vice versa for eggs. The Aylesbury, too, is often crossed with the Runner with an eye to early table ducklings, whilst the Runner may be crossed with the Buff Orpington for egg-production. Many who follow such breeding never depart from the first-cross, whereas others maintain the latter by using pure-bred drakes. If, for instance, it is desired to maintain a first-cross resulting from the mating in the first season of a Runner *drake* and Aylesbury ducks, the next season (or when they are ready for mating) the progeny are mated to a pure Aylesbury *drake*. The following season that progeny is headed by a Runner *drake*, and so on alternately.

Laying and Breeding.—It will be well here to treat upon the laying of ducks, so that the same can be linked up with my notes on breeding. The duck, generally speaking, lays in batches with intervals between. Only one or two eggs are perhaps forthcoming at first, followed by a day or two's rest when there is a long unbroken daily sequence for several weeks. After another rest there is another long sequence, and so on. It is necessary to state this, because novices are usually much alarmed when they find their ducks laying in this peculiar fashion.

Maturity depends upon the breed, such light-weights as the Runner being fully grown and in lay sooner than heavy varieties like the Aylesbury. Some ducks will commence to lay when from four and a half to six months of age, others when eight or nine months old. And the older the ducks become the later they commence to lay. For this reason the raiser of early table ducklings marketed from January to April usually relies upon early-hatched ducklings of the previous season for his eggs for incubation. These are mated up in October, November or December as the ducks come into lay, during which period it requires very careful management to secure a large percentage of fertiles. By the time February comes round fertility increases, and in the spring and summer remarkably fine averages of fertiles can be obtained, often from ninety to a hundred per cent. I have known novices at such times bring out ninety-five and ninety-eight ducklings per hundred eggs.

The usual plan when breeding for flesh is to mate up in October or November, so that very early ducklings will be forthcoming to meet the best markets. March-hatched ducks of the same season are usually employed, being mated to drakes brought out late the season before. Where January or February males are available these can be used.

As regards the breeding of laying and stock ducks, such early mating is not commonly practised. April and May ducklings are usually relied upon to produce the next season's laying and breeding stock, but I am in favour of more progressive methods. To secure a full egg-basket throughout the year I like hatchings to take place in February and March, April and May and August and September. February and March ducklings will give us our autumn and winter layers, our breeding females for early mating and our vigorous young drakes. April and May ducklings will give us laying stock that will come into profit early in the new year, and August and September stock will fill the egg-baskets in the summer and autumn. In the past the duck-keeper has not worried much about systematic breeding and hatching, but my readers are advised to pay strict attention to such matters and to plan them according to the breed kept. Do not be afraid of early hatching, which has hindered the cult of the duck very much, but plan your hatches according to (1) breed, (2) winter eggs, (3) eggs all the year round and (4) times of matings decided upon the next season to produce further laying and breeding stock respectively. Master the breed specialized in, as methods that suit the Runner will not give the best results when put to the test on the Aylesbury or Pekin.

The pens should be mated up a month before eggs are required for incubation, as the first eggs are often unfertile. All the ducks in the pen when mated up should be for preference in lay, and the drake can be added when this condition is arrived at. One can, of course, mate "in" and "out of" profit females to the drake, but better results are achieved where all the females are laying, or at any rate very nearly so. Females that are completely out of laying condition tend to upset things when included with others that are contributing daily to the egg-basket. No doubt it is because they refuse the attentions of the male, who in turn resents their presence. It is a point to remember.

Breeding for Eggs.—There are those who still regard the duck as only a spring, summer and autumn layer, and regard it as next to impossible to obtain winter eggs from the layers. It is a pity these erroneous views have been handed on and on to duck-keepers for so long, because they have been the means of hindering the laying merits of the duck from being fully appreciated.

It has always been the universal opinion held by duck-keepers (and is to-day) that ducks commence to lay in February or March and lay up to and through the autumn, taking a well-earned rest in the winter months. The general farmer made the same mistake with his laying hens. He was able to obtain from his layers plenty of eggs from the spring onwards and right up to and throughout the autumn, but not in winter. He gave Biddy up as a "bad egg" for winter production, and left her very much to her own resources during the bitter wintry elements, paying no attention to her special requirements whatsoever. Not content to take for granted the general farmer's slogan that "every hen died in debt," the progressive poultry-keeper came along and handled the laying hen differently. He planned his own programme for Biddy, which meant a special time for hatching, careful handling from egg to maturity, a timely moult, and progressive methods of feeding and management in the winter. The case of the duck is identical!

Whilst the natural laying season for the duck may be from February onwards, eggs can be forthcoming in the winter months if a set plan is arranged. First comes hatching, secondly progressive handling of the duck from egg to maturity, and thirdly common-sense feeding as befits the season. With these essentials must be bracketed breeding, to which in the past very little attention has been paid.

As regards hatching, the owner of laying stock must take a leaf out of the table-duckling rearer's notebook. Where early table ducklings are required for the market from January onwards fertile eggs are a *sine qua non* from October to December, and if winter laying was next to impossible such early table ducklings would never reach the market at a time that they do. The raiser obtains his objective by hatching early in the season—February and March—and the ducks then hatched are used in the breeding pens the next winter.

The "egg" man must do likewise, and he must hatch out his winter laying ducks in February and March. True, it is a good policy to have ducks in lay in the autumn so that their eggs will come into the market when hen's eggs are "off" on account of the fowls being in moult. Our objects can best be achieved by hatchings in February and March, April and May, and August and September and then we may be sure of eggs all the year round.

Where one is able by reason of excellent environment to keep ducks on fairly extensive lines, the various hatchings will help the egg supply as well as the breeding operations.

Pedigree Breeding.—Many of my readers will be surprised to find me audacious enough to recommend pedigree breeding. This is not the first time, however, that I have done so. Many years ago in my writings I insisted on pedigree work in duck-breeding, and claim to be the first ever to have voted for such a cause. I am, however, modest, so will only reprint two short extracts from my earlier book on duck-keeping. Writing of the breeding of table ducklings, I said :—

> "If table ducklings are desired we shall be wise if eggs from big heavy-framed stock birds only are chosen. The records of all stock birds should be kept and the weights of their progeny recorded, then the breeder can at a glance see which ducks breed the best table progeny and the ideal drake or drakes to use as mates. No haphazard methods will succeed; of this I am quite sure."

And dealing with bred-to-lay ducks, this is what I said :—

> "If egg-production is our main object we must base our calculations on similar lines to the utility poultry-keeper. Our common-sense tells us that no progress will be made if we do not select our stock year after year, with a view to increased egg-production. A good laying duck will cost no more to feed than a bad layer, whilst my experience has proved without doubt that the bad layer will cost more. We must therefore take into account the number of eggs the ducks lay during the season, the size and colour of the eggs and the time of the year they are produced. If we work on these principles and breed from the best, our hopes of making egg-production a success may be realized."

Had all duck-breeders followed my advice then, each would now have been securing very handsome profits. Perhaps my second "hint" may be carefully pondered over by all who keep ducks.

The duck offers to the would-be keeper all the profitable assets given by the hen. There is a lot of good money in the disposal of sittings, day-old chicks and pedigree stock ducks of all ages and both sexes, and the field is open to one and all. To-day breeders of heavy-producing pedigree strains of hens represent quite a mammoth army. It has not always been so, but as one who has watched Biddy climb the egg-ladder until the 300-eggs-per-annum yield has been exceeded, I can with authority say that such achievement has been made possible by pedigree work and strain building.

The same process awaits the duck, and I am most pleased now to see many breeders with full steam up. I ask for systematic breeding, trap-nesting and pedigree work to be universal with our flocks of ducks.

We have a very strong Utility Duck Club now in being, thanks to the efforts of Mr. E. A. Taylor, the White Runner specialist-breeder, and it is now holding a laying competition for ducks. In the future I can picture many strong egg contests for the various breeds of ducks, and it is high time the bred-to-lay duck took its rightful place arm in arm with the little busybody British hen.

Opportunities in Duck-breeding.—I am rather nervous of bringing too strongly into the limelight the opportunities ahead of the duck-breeder. I have championed the cult of the duck on very many occasions, but the chances have not been seized. I again remind those interested of the excellent openings, and instead of saying "I should never have thought it," I trust one and all will take advantage of my advice and do something.

The "egg" varieties should appeal to all progressive breeders who are prepared to improve their strains and maintain heavy egg-production. The material is there, as I have already stated, and it *is* surprising why the duck boom has been so long delayed. Here are a few laying performances of Runner ducks which alone should show the real merits of ducks as layers when compared with hens:—*New South Wales:* 1,940 eggs from six ducks in eighteen months, and 3,183 eggs from six ducks in three years; *New Zealand:* 900 eggs from six ducks in six months (April to September); *Australia:* 958 eggs from six ducks in six months (June to November); *Western Australia:* 1,680 eggs from six ducks in twelve months. The latter is the best record yet set up, although I am not sure if it is official; the world's record is generally regarded to be held by the six Runners which at Hawkesbury College, New South Wales, laid 1,601 eggs in the twelve months' official test. There is ample scope, therefore, for the progressive duck-breeder, and money-making opportunities.

As regards the monetary side, the following facts will prove to the reader that the specializing in pedigree laying strains of ducks is well worthy of the closest attention :—

One Runner duck-breeder's order for egg-boxes last year exceeded twenty-five gross at a cost of over £75. Apart from ducklings too this same breeder's sales of stock ducks ran into thousands during the twelve months.

If further proof is necessary, the following extracts from current letters I hold from duck-breeders will suffice :—

"I have offered your friend March-hatched laying ducks (kept for stock) at £1 5*s*., £2 and £5 each carriage paid."

"We have orders on hand for hundreds of day-olds for May and June delivery."

"Am sending two more pedigree drakes to S. Africa next week at big prices."

"I have over three hundred ducks mated."

"I sent out over a hundred ducks this last week, every one £1 1*s*. or more."

"Sales continue good—300 birds in two months—and takings for last month again up."

"I propose to rear 2,000 laying ducks next year besides my other stock."

"Am literally swamped with orders for ducks ; but I will give your student priority out of courtesy to your good self."

"Takings this past year are again £100 up and profits 100 per cent. on turnover."

"I have some five thousand inquiries annually."

"The Utility Duck Club is now stronger than all other Waterfowl Clubs put together, and we issued 2,000 booklets last year and could have done with 5,000."

Those of my friends who should recognize among the above extracts from their letters to me are asked not to be cross. In the good of the duck industry I think such facts should see light o' day rather than be boxed up in my files.

The specialist breeder in heavy bred-to-lay trap-nested strains will choose as his channels the disposal of sittings for incubation, day-old ducklings and pedigree stock ducks and drakes, whilst the eggs will be placed on the market as new laids out of season. Those who are bent on meeting with success are advised to use well-printed and nicely-illustrated memos, and all literature issued should have a distinctive " ring " of originality about it. A photographic catalogue of the farm and stock should be issued, and the breeder should remember that *photographs talk* louder than cold print. The specialist duck-man should be ever ready to help the novice with advice, and considering that much ignorance is displayed in the cult of the duck he might be progressive enough to issue neat helpful leaflets. These would represent a very fine advertisement for the strain and might include separate advice on feeding, incubation, rearing, management, etc. The person who bought a sitting of eggs could have a leaflet enclosed on how to incubate ducks' eggs, whereas the purchaser of any day-olds would have the one on how to rear ducklings. I always insist upon my students using first-class stationery because it raises the standing and value of all produce.

There are ways and means of conducting duck-operations on very extensive lines without having an unnecessarily large establishment. I refer to what I term "out-farming." The breeder loans some of his breeding pens to neighbours and farmers who are well placed as regards environment, the agents feeding the stock ducks at their own expense and selling the sittings or day-olds hatched out to the specialist breeder at fixed prices agreed upon beforehand. There are of course a hundred and one ways of working this system. The agent has no outlay for stock and can make a good profit for food and labour, whereas the breeder can keep his customers supplied and save on his rent and labour, which would mean a very heavy item had he to find the same. One establishment can deal with breeding stock, another with hatching, a third with rearing to maturity, and so on if desired, the breeder fitting out the agent with incubators, foster-mothers and appliances if he has not the necessary plant. Financial help can be given in any direction, but the main thing is to supply your own breeding stock and ducks of your own strains and to select agents who are reliable. The agent must sell all sittings, ducklings and stock ducks and drakes he is called upon to deliver at the agreed prices, and must not sell any produce except out of season when the eggs can be "doctored" and sold for eating purposes. To make the eggs useless for hatching purposes either pierce the shell with a needle, pushing this into the yolk, or place the eggs to be treated in a string bag and immerse them in a bucket of boiling water, withdrawing them almost at once. Any small duck-keeper who is well placed can, if he desires, approach any of our big breeders and offer to act as an agent.

Out-farming has another real advantage in that several strains of ducks in the same breed can be kept distinct. On the home establishment can be located the most important strain, whereas special agents can handle other unrelated strains. When a customer orders a breeding pen of stock ducks he asks for the drake to be unrelated. If the females are supplied from the "home" farm, the drake can be delivered from another strain held by one of the agents. The breeder interested in pedigree work will be well advised to keep at least two strains, mating them on progressive lines but keeping the stock completely distinct. Strict records will be necessary, and all stock specimens and ducklings must be toe-punched or rung with a leg-band, or both.

On Trap-nesting.—Success in pedigree work with ducks can be achieved only by very much thought, time and labour. But what of that so long as our objects are achieved, viz. increased egg-yield per duck and per flock, and early maturity. Whilst the breeder directly benefits in regard to greater flock-averages he must not forget that he also raises the standard, and consequently prices, of his produce. The new-laid eggs become valuable for sittings at prices according to the egg-power of the strain; the table duck increases in value from 5*s.* to 40*s.* or more, and the day-old duckling provides the breeder with a profitable channel at double the prices asked for sittings.

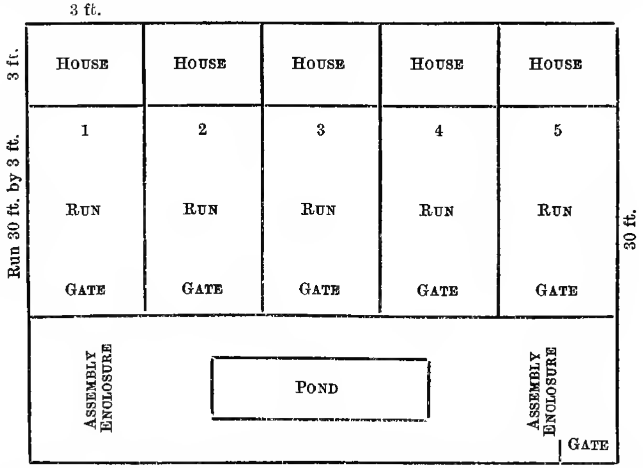
The trap-nesting of ducks is very different to that of hens, for the very reason that the latter work the traps without any assistance. The former cannot be relied on to walk into ordinary trap-nests of their own accord, although what the future has in store I do not know. Perhaps selective breeding may give us the self-trapped duck! You smile, but do you know that selective breeding within the strain has resulted in the establishing of a much stranger trait? Those who keep pigs will know the trouble often experienced with certain sows through their laying on the piglings. True, you can erect rails of many designs round the inside of the sty, but would you believe that selective breeding has been proved to be a certain remedy? One of our best-known and most experienced pig-breeders decided to stamp out this abominable pig-crushing, and he discarded the use of protective rails. Instead he taught each pig to lay down properly without flopping, and bred only from those he mastered. After very much care he evolved a "gentle-squatting" strain of pigs.

Those who care to experiment can erect ordinary oblong covered-in nests along the back of the duck-house, the front being arranged much on the lines of an ordinary trap-nest. As the duck enters a blind or shutter drops, thus excluding any other duck and keeping the inmate confined until released.

The plan most commonly adopted in the trap-nesting of ducks is to have a series of covered-in well-ventilated boxes or nests inside the house. When the ducks come in at night each is placed in one of the boxes and left there, the nests being supplied with litter. In the morning about eight o'clock the nest-boxes are visited. Each duck wears a distinctive coloured or numbered ring on one of its legs, and if it has laid the egg is recorded on the record-sheet, whilst the duck is released. Any that have not laid are confined to their nests for another hour before all are let out (after any eggs laid have been recorded) to join those (having already laid) in the outer enclosure, when the flock is released to enjoy free range.

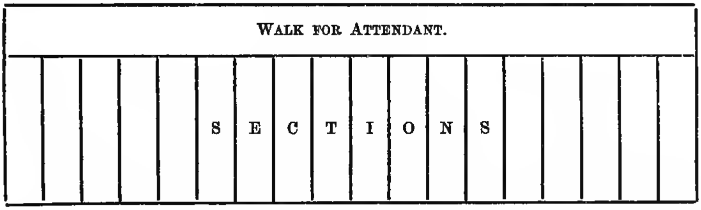
Another plan of trap-nesting is by single-pen testing. Each duck has a small house 3 feet by 3 feet (the houses being continuous and under one roof, but divided off into 3 feet sections) and a run 3 feet by 30 feet. At the bottom of each run there is a gate leading to the assembly enclosure, which if desired can contain a swimming pond. If in addition foraging is allowed the assembly enclosure can lead out to free range. The idea will be understood from a glance at the sketch (see next page).

By day the ducks are allowed to run together in a flock, but at night when they arrive home they are confined to their assembly enclosure. Each duck is gently driven into its proper run, when the gate is closed. As each duck wears on its leg a numbered or distinctive coloured ring or leg-band (red or white or black, for instance) it can be quickly sorted out and placed in its small quarters, the gate or door to which carries the number or colour of its leg-mark. The ducks are then shut up for the night, and all are released at 9 or 10 a.m. in the morning, when they join each other in the assembly enclosure and have a swim or go out on range. The eggs are recorded to the respective layers. If one does not catch the ducks or trouble to drive the proper ones into their respective small runs he can drive any duck into any enclosure so long as only one occupies each house and run. In that case before each duck was released its distinctive ring would have to be noted so that it could be credited with any egg laid. Such houses would have to be bedded down and erected on lines already recommended.

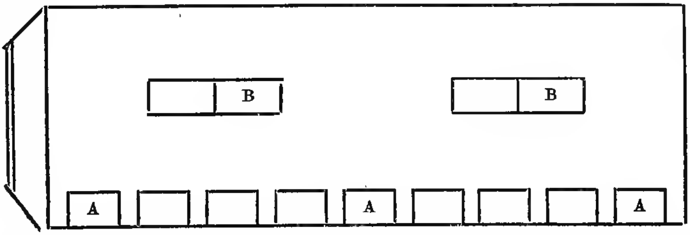


It may be desired to make use of an existing structure, and to trap the ducks without catching each individual and shutting it up for the night in a nest or box. To accomplish this the inside of the structure would have to be divided into many small compartments, each bedded down, and with a walk at the back for the attendant. The divisions would consist of wire-netting or matchboarding to the desired height. Each small section or division would have a trap-arrangement on the drop-wire system adopted by the pigeon man. The idea is to adopt an arrangement whereby no admittance is possible for another duck after one has passed through the entrance into its section within the house, and one which prevents the inmate once inside from escaping. An ordinary trap-nest front would do.

To carry out his plan all he has to do is to make an entrance or aperture at the bottom of the front of the house governing each small inside division. Having opened or set the trap-fronts covering the entrances he must drive the flock of ducks quietly up to the entrances to the sections, and as each sorts out its own aperture the various trap-fronts fall until all are accommodated. In the morning the attendant visits the house and records the eggs, releasing all the ducks at a given time and letting them out into the assembly enclosure and then on to free range. The house will be divided as follows :—



The front of the house will be designed as under, A representing the range of trap-fronts, one to each inner section and B two windows :—



If two flocks are being trapped under this plan, sections and trap-fronts can be arranged on both sides of the house, there being an attendant's walk down the centre of the building.

The plan selected will depend upon the number of ducks kept and the head of ducks to be trap-nested. Only those from which are to be selected future breeding stock need be trap-nested. Ducks are to a degree nervous, and mainly when they are frightened. There is a lot of difference between ducks being hustled by their owner and by their owner's dog ! I do not entirely agree with those who say that ducks are too nervous to be trap-nested. Pullets are also nervous when first called upon to enter trap-nests and will often refuse the invitation, preferring to lay their eggs on the floor until they pluck up more courage. The operator can help matters where the duck is concerned. In the first place, let him remember that the proper way to catch a duck is by the neck, and not by the legs unless he wants to break the latter. Secondly, when driving the ducks into the traps or small runs, let him employ gentle methods, trusting that the ducks will get to know in time what is expected of them. It is essential at first that one should be patient. Thirdly, when so driving the ducks or catching them let the usual feeders attend to the procedure, as the ducks will know them and not be unduly alarmed. And let the operators be dressed much as usual on such occasions ; a bright red coat will denote danger if the ducks have grown accustomed to a white apron. Fourthly, let the trap-nester remember that he can do much to make ducks docile by judicious handling from egg to maturity. He should therefore have an eye on the future when managing the likely breeders during the growing stages. The duck is clever and knowing, particularly where there's some food to be had. If it is accustomed to having a little food when safely confined to its trap-nesting quarters it will show a willingness to be among the "grub." Do not leave detailed trap-nesting work or the handling of the stock being trapped to irresponsible boys or you will be asking for trouble. Personal attention always pays ! You will never stop a growing lad from whistling and making quaint noises, and he is not the ideal person to handle valuable breeding stock, although his assistance when you are present will be helpful because he will behave himself. Use trap-nests that work easily and noiselessly.

Where single-pen trap-nesting is adopted the owner may not wish to go to the expense of a continuous house under one roof. In that case each small enclosure must possess a separate duck-box to accommodate the duck being tested out. The ducks should not be shut in until as late as possible, although they can be confined in the assembly run earlier. Each small duck-box must be well ventilated and bedded down, and be provided with a door. The latter should be closed the last thing at night when the inmates have settled down, so that they will be protected from foxes, rats, and the like.

What becomes of the drake? I hear you ask. If the ducks are being merely tested-out for laying no male bird perhaps will be running with them. If, on the other hand, the owner is breeding from the ducks as well as testing-out the drake will be handled according to the method of trap-nesting adopted. If the separate small runs are used the drake can be placed at night in the various pens in turn, to-night sleeping with duck No. 1 and to-morrow night with No. 2, and so on. Where the ducks are shut in separate trap-nests within one large house the drake can be confined in a sleeping-box by himself. If this is not carried out one odd duck can be left with him on the ground, so long as this is bedded down and the duck can go to nest if desired. Her egg must be recorded in the morning, and the ducks can take it in turns in accompanying the drake at night. Where several drakes are in charge of the flock they can sleep on the bedded floor of the house and will have sufficient company in their numbers. One duck at a time and in turns can be left with them if desired, but this may excite her and result in abnormal eggs owing to the attentions of so many males, a point to question when soft and abnormal eggs are laid.

Egg-recording.—The recording of the eggs will depend upon the owner's special object. If he keeps a flock of laying or breeding ducks and is not interested in trap-nesting or pedigree work he will be concerned only with flock-totals. Inside each duck-house can be hung a recording-sheet on which will appear the date, pen number, breed, number of ducks and total of eggs for the day. These sheets will be taken into the house at the end of each month, when the daily totals can be transferred to a monthly sheet or into a notebook reserved for the purpose. Early in the book can be placed on record the age of the stock and other particulars. I give here a handy ruling for the monthly sheet. In addition to the monthly total the duck-keeper can also work out such items as average egg-yield, cost of food, value of eggs, etc.

Pen No. . .	1	2	3	4 etc.
Breed . . .				
Age .				
No. of Ducks .				
Additions . .				
Removals . .				
Returns. . .				
Deaths . . .				
Sold . . .				
Jan. 1 . ,, 2 ,, 3 . . ,, 4 . . .				
Total for month				

Where trap-nesting records are kept the sheets should be hung handy near the trap-nests, so that the recording can be attended to on the spot. I give a sample record card and the ruling can be planned to cover:—Date, breed, pen, number of duck or colour of eg-band, eggs laid, weight of eggs, broody period and other data. These sheets can be collected each month and their contents trans-

Breed...... Pen...... Month...... Year......							
Date	1	2	3	4	5	6	7
No. of Duck							
1							
2							
3 etc.							

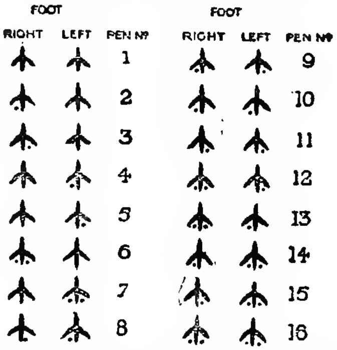
ferred to a special book recording the merits of each individual. With such permanent records must be included the pedigree of the individual, date hatched, date laying commenced and total for the year, together with the winter total of eggs and weight of year's yield. Nothing must be left to chance, and whilst complicated accounts should be avoided the records should be detailed and so arranged that the owner can at a moment's notice look up any particular item regarding the antecedents of any individual duck.

Each duck must wear a coloured or numbered ring on one of its legs, and the colour or number must appear on the record-sheet. When she has laid, the egg must be placed to her credit, and on the shell must be pencilled the date, the number of the pen and that of the layer, also the initials of the breed. For instance, the following on an egg I.R., A., L L 21 (or L L R), 139 would read: Indian Runner, pen I (A B and C or X Y Z representing pens 1 to 3), left leg ring No. 21 (or left leg *red* ring), and March 1 (the *first* of the *third* month, 1919). Where eggs are sold for sitting it is advisable to use such wording that can be understood by the vendor only. At night the eggs should be weighed individually and the weight of each can be booked up to the individual layer, so that at the end of the month the total weights will be known. Colour of egg should also be noted as ducks lay variegated eggs as regards colour, some being white, others cream and green and so on. White-shelled eggs are the ideal for marketing purposes, and where heavy bred-to-lay commercial ducks are kept this excellent point should be noted and used to the full when the breeders are being selected.

Apart from recording the weight of every egg laid make special note in the accounts of the responsible duck of abnormal and freak eggs. Trap-nesting will tell the breeder which ducks are out of sorts and want treatment by way of a tonic. Eggs found out on range can be booked down to the flock, but not to any individual layer *unless* one is sure of his ground. Avoid guesswork in all its forms.

Marking the Ducklings.—Where pedigree breeding is practised there must be a definite system of marking the eggs and also the ducklings, so that their pedigree will be known. There are two methods of distinguishing the ducklings: (1) by toe-punching, and (2) by leg-bands, although it is an advantage to combine the two. With chickens there is a set system of sixteen toe-punch marks, as will be seen from the illustration given. There are many designs of toe-punches obtainable from poultry-appliance firms, and I prefer the small ones as being easy to work and not so clumsy as the large patterns. By pressing the sides of the little accessory a needle passes through the web of the duckling's foot, leaving a small neat hole right through which increases in size as the duck gets older. Toe-punching must be attended to directly the ducklings are hatched, and the holes should regularly be cleared of dirt by means of a sharpened match stick to prevent them from closing up.

List of Toe-punch Marks.



With chicks, owing to the narrow webs, only one hole can be pierced in each, but with ducklings two or three toe-punch holes can be made in the same web, owing to the size of the latter. One is able therefore to plan a goodly number of toe-punch marks for ducklings from either special pens or individual ducks. A stud-book must be kept giving the matings and the punches used in each case; there must be no guesswork.

The second system of marking is by means of leg-bands, either coloured or numbered. There are disadvantages, however, in this plan. In the first place if during foraging operations a ring falls off it is difficult to know the pedigree of the duck or drake concerned. Secondly, the rings will need to be changed several times, as those placed on the leg at hatching time will not last till maturity is reached. One can overcome the latter drawback by toe-punching the ducklings when a day old and ringing them when they have finished growth and can carry the same sized rings permanently. Perhaps it is well to combine the two methods of marking.

If numbered rings are used the figures should stand out prominently, so that as far as possible one can read them without handling the duck, which may be necessary under certain circumstances. Coloured leg-bands or circlets have an advantage in that they can be readily distinguished without handling, and of course both numbered and coloured leg-bands can be used if individual cases warrant it. Where numbered rings are used the pedigree of the individual duck must be recorded in the stud-book against the number on its leg-band. If desired the numbers on the rings worn by drake and duck can be added together and divided by two to give the number on the leg-bands worn by all the progeny from the two. Thus a No. 20 drake and a No. 2 duck would make a total of 22 which, divided by two, would give eleven ; all progeny from such a mating would carry leg-rings with the number *eleven* on them. The system adopted will depend upon the individual breeder's special circumstances and his objective.

Progeny from pen I can wear *red*-coloured rings, from pen II white, and pen III blue. Offspring from a red-rung drake and a blue-rung duck could wear a red ring on one leg and a blue one on the other, and so on. Private persons having ducks that are allowed to swim with ducks of other owners on public water will be well advised to have them both toe-punched and rung. The leg-bands can carry the name and address of the owner if desired for identification purposes. In such cases when the ducklings are ordered the vendor should be asked to toe-punch them prior to dispatch.

When being incubated the eggs must also be marked, so that the owner will know how to toe-punch or ring the ducklings as they hatch. If artificial hatching is adopted, each hen should have eggs from the same laying duck, so that directly all the ducklings are out they can be systematically toe-punched according to the plan agreed upon. Where they are mixed, the eggs should be transferred to an incubator the day prior to hatching time. They can be placed in muslin bags and the ducklings put with the broodies after being toe-punched, being introduced a few at a time and at night. When the eggs are taken from the broody nest eggs should be given her to "cuddle." It is not every hen, however, that will take to ducklings she has not hatched, and patience must be practised. If desired, the broodies can be reset, thus feeding the incubators, which combination is, I always consider, well worthy of support. If artificial incubation is adopted, each egg can be placed separately in a thin muslin bag when it is noticed to be "pipping," and as each duckling hatches out it can be toe-punched and returned to the machine. At night when the owner retires the remaining eggs that are likely to hatch out before morning can be separately "bagged," space being left for the duckling to rest inside the bag after getting clear of the egg.

Special partitioned egg-trays can be used if preferred, or the various groups of eggs can be divided by means of wire-netting the day before they are due to "pip." If rings are used from a day old watch them closely or they will eat into the duckling's legs as the latter grow thicker.

The system of marking ducks will probably depend upon the individual breeder's pet fads. It generally is so with fowls! Some breeders are fond of using coloured rings to correspond with numbers as already recommended, whereas others will follow the same plan but will arrange the colours alphabetically. In conjunction with systematic marking it is well to adopt some plan—additional or otherwise—of distinguishing age. This year's ducks, for instance, can be rung on the left leg and next year's on the right, whilst in addition to the year the month of hatching can well be covered. The latter may be arrived at by a small additional ring carrying a number corresponding to the month. Of course, where metal rings are used the date and year can be cut or engraved thereon. Or notches can be filed along the top or bottom rim, a method that is applicable to any rings.

Where the ducks are separately trapped and run in flocks by day, as dealt with elsewhere, a coloured ring on one leg can be seen more readily than a numbered one, and it can be used in conjunction with toe-punching. If the latter is not carried out perhaps it is well to ring both legs, so that should one leg-band be lost when the duck is out foraging the other will give the key to its pedigree and the missing circlet can be replaced.

Breeding Records.—Where systematic breeding is practised, we shall need specially designed stud-books. In one book the rulings might include: leg-band number or colour, breed, sex, date hatched, pedigree, started to lay, yearly total, general remarks, etc., etc. Under *general remarks* can be placed any peculiarities, excellences or weaknesses. In the case of drakes, their fertility records will be very essential.

As a mating record I favour something after the following :—

Pen No.	Breed.	When mated.	Sire's dam's record.	Sire's grand-dam's record.	Ducks.						Remarks.
					1		2		3		
					Dam's record.	Grand-dam's record.	Dam's record.	Grand-dam's record.	Dam's record.	Grand-dam's record.	

To carry the system further the individual duck's sire's dam's record and sire's grand-dam's record can be copied down. Success in pedigree work depends upon the owner knowing the ins and outs of every single duck and drake on the establishment, and planning his breeding operations accordingly.

Eggs versus Ducklings.—As I have already stated, much in this chapter will strike new to the duck-keeper. The reader must sort out the information, adopting those methods herein given that best suit his or her special circumstances. It is in her first season of laying that the duck is the most prolific and she starts to lay later each year as she gets older. For this reason, where egg-production is the main objective the major portion of the stock should be yearlings. And if we feed the duck for eggs the first season, getting her into lay by October or November and keeping her in lay the full twelve months she can rest during the following autumn and come on to lay at will early in the new year, ready for breeding in her second season. During this first full season of laying she can be trapped so that when tested out the best producers can be selected as breeders. If desired, some can be trapped in their second season when mated so that the best can again be singled out for future breeding. Carry a small selective head of breeding stock once things have settled down and a large flock of layers rather than a heavy number of "mixed" breeders. Again treat both sections on different lines as befits breeders and layers respectively.

Early-hatched Drakes.—As I am a great advocate of the use of first-season drakes in pedigree work I am in favour of very early hatching—January or February—to procure such specimens. Only a few eggs need be put down, but where one is interested in pedigree breeding January- or February-hatched drakes will come in most useful for winter mating and the subsequent early ducklings of the next season. Besides, should one decide or be compelled to use matured first-season March- or April-hatched ducks in the breeding pens the following spring these males will be their seniors by a few months, which is a great advantage, as I insist on age being on one side of the mating.

Ducks remain in breeding condition up to and exceeding their fourth year, which is an advantage, as any extraordinary layers can be kept on and mated up to "bred-to-lay" young males to maintain and improve the egg-strains.

Quality tells.—Quality always will "out"—a point all interested in livestock should bear in mind when it comes to the question of breeding. We must start with sound well-bred foundation stock that will give us the right material. Our object must be to aim at improvement every time we mate, and if a start is made with inferior specimens how can any improvement possibly be made?

If it is worth while keeping ducks then let them be good ones. The breeding results will be satisfactory, yielding the desired material, and thereby proving the foundation stock to be purchased economically in the long run. The poor laying duck will cost just as much (if not more) to feed as the superior specimen and yet there will be a marked difference in the returns. It is false economy to begrudge a few extra shillings, or pounds for all that, on the original stock ducks.

Detail work will also bring its due reward, and no ailing specimens should find their way into the breeding pens. Rearing records should be kept, those ducks that have romped away from the start and had no set-backs by way of ailments being used eventually as breeders.

Selective Breeding.—Even where pedigree or systematic breeding of any kind is being put into operation it must go hand in hand with selective breeding. Just as my friend the pig-breeder evolved a strain of "gentle squatters" by selection and line-breeding, so can you remove weakness or bring in and maintain strong points in your strain of ducks. The main thing is to know thoroughly the good and bad points of every duck on the place and what peculiarities—good, bad or indifferent—each drake or duck has.

Aim at early maturity in your strain of winter layers, paying strict attention to the time when each duck commences to lay. Keep strict records of this "starting-to-lay" point of merit and establish it in your strain by selection mating after mating. Go back for such points to your sire's dam and grand-dam, and your sire's sire's dam and grand-dam, your dam's dam and grand-dam, and your dam's sire's dam and grand-dam. It is this prolonged breeding that "fixes" the points aimed at.

Type-selection also aids systematic breeding. In every strain of heavy-bred layers there will be one type of duck which will stand out from the rest for egg-returns. This is the type to foster. It will of course vary in the different breeds, but the observant eye will not miss it. The trap-nest records will give the breeder the key, and as he is successful in breeding, season after season, very heavy layers, so will he be struck by this type which is peculiar to his strain. I cannot enumerate what the point may be because the records will decide that. Having gained experience in duck-breeding for heavy egg-production, compare types with the individual records until you can focus on your mind the "ideal" type common to your strain which seems always to be successful from the laying view-point. You may notice, for instance, that a certain type of duck breeds early-maturing youngsters and you will therefore foster it. You will continue with your methodical breeding, whatever it may be, but you will combine your breeding plans with the selection also for type, giving preference in the pens to those of equal laying merit but of the ideal type. As well as knowing your ducks know also your breed, as these are two essential stepping-stones in pedigree work.

Again stamina and vigorous constitution must be ensured. First of all we must have the *hatchable* egg selected from a batch of perfect eggs all from well-mated and well-fed parents. Then we shall be sure of the *rearable* duckling which, too, is a *sine qua non.* Pedigree work is expensive in its experimental stages, but when well on the way the extra returns repay the outlay with interest. It is a good motto to "breed well and kill well" when pedigree breeding, a point I impress upon all my students who are interested in the breeding of heavy egg-producers. By this I mean that it does not pay to rear weaklings which may at some later date go unnoticed and find their way into the breeding pens, Proper and detailed rearing records should be kept. First of all there should be the *general* records, the headings including :—Breed, date of hatching, mode of hatching, number of eggs set, number of ducklings hatched, number of pen, deaths, causes of deaths, number reared to maturity, number of drakes, number of ducks, number sold, and notes. From such accounts should be separated the deaths, which should be traced to the parents responsible. The pedigree of each duckling will tell the breeder the parent stock to blame. Accidental deaths should of course be distinguished from diseases, and post-mortems should be held on all dead ducklings. Ailments of a temporary kind should also be recorded against the ducklings (and adults for all that), so that when the time comes to select the breeders only those that have been entirely free from illness will be used in the pens. Particularly is it necessary to look up the "health" record of a drake ere placing him in the breeding pen. Remember that bred-to-lay ducks are prolific layers and will be more so as you improve your strain, which means that to fertilize these eggs the drakes must be full of stamina. People will tell you that pedigree work will ruin the duck and take away stamina. Yet such breeding has not killed the bred-to-lay hen, which has had very many years of selective breeding attached to it. It will not therefore affect the duck, which has, I maintain, a high unspoiled constitution. There are always ways of maintaining health and vigour, however, which after all is the essence of selective breeding. Constitutional vigour is essential because *more and more eggs* mean a greater strain on the individual's system.

Constitutional vigour should be placed foremost in all matings. All ducks and drakes selected for breeding purposes should be from healthy and vigorous breeding parents which have been easy to rear and free from any serious illnesses, whilst they in turn should also have the same qualities as regards rearability. The use of two-year-old ducks in the breeding pens with young, vigorous, well-matured males at the head will do very much to ensure constitutional vigour in the offspring, and for continuous pedigree work is, I think, highly essential. If eggs are the objective the first season, whilst the ducks are being tested out, they can be handled quietly after their spell of laying and allowed to come into lay in the second season at their leisure ready for breeding. During their second year of laying they will not be fed for eggs but for vigorous ducklings instead. The menu will be by no means forcing, as the fewer the eggs the stronger the ducklings in the second season, and of course their merits will be known owing to the preliminary testing-out. They can, if desired, be trap-nested during the second season, and the most prolific layers used as breeders the third year, and so long as they remain in breeding condition and fertility and rearability prove in every way satisfactory.

Many authorities are under the impression that the breeding of heavy layers means the putting of more and more eggs into the duck's ovary. This I contend is wrong. The laying strain is improved, season after season, by the elimination of the weakness and by the fixing of those points which enable the duck to lay her quota of eggs in a shorter period of time. When matured she has in her ovary, I maintain, all the embryonic yolks she will lay in her lifetime. Nature put the store there so that she could absorb any surplus yolks into her system should she be unable to find sufficient natural food, as in the winter. In other words nature decreed that the duck should lay a few eggs each season until she died of old age and the rest she should devour inwardly to sustain her in times of need. But domestication has intervened and by providing the duck (or hen) with ample food in all seasons the surplus yolks have been released and have not been needed for inward absorption. It is a case, therefore, of speeding up the supply by doing everything to aid the extraction rather than the absorption of those thousands of yolks inside the ovary.

We can do this by encouraging in our strain early maturity and rapidity of egg-production, selecting for the breeding pens ducks and drakes (bred from females) having those points in a marked degree. We can also aim at longevity of laying. With ducks and hens of bred-to-lay strains it is invariably found that more eggs are laid the first year than the second. Exceptions will, however, be met with, and the pedigree duck-breeder may decide to establish a "longevity" strain by fostering this trait by selective breeding on defined lines. This would be a very fine advertisement for the strain, particularly when the owner has established a line of ducks that will lay as many eggs (or more) in their second season as in the first. And nothing is impossible of achievement where strict records are kept and where selective breeding is carried out in detail over a lengthened period.

Crop development goes hand in hand with selective breeding for the very reason that a hardy eater is a good-doer. If only those that have been easy to rear from shell to maturity are used in the breeding pens this will greatly help matters in the direction indicated.

For very many years even the pedigree breeder of laying hens was not over-careful in his choice of male birds. He was under the erroneous impression that because the male bird did not lay eggs he could not influence egg-production as regards the progeny. It was a happy thought of the one pedigree breeder who suddenly, and not very long ago, began to select his male birds according to the laying merits of their dam. The results were startling, and such selective breeding on the male side has done much to increase the prolificacy of the laying hen. The same applies to duck-breeding. No bird should be bred from whose egg-record and antecedents are not known, and no male should be used if not bred from a heavy-laying mother. The records are all the more valuable if carried back still further to the dam's dam or male's grand-dam. Where, too, you are breeding for colour of egg all males used in the pens should be hatched from eggs that conform to the "ideal" colouring of shell. There must be selective breeding in both sexes if valuable points are to be fixed in a strain.

Many after paying a goodly sum for the original females make the great mistake of mating them to a cheap and inferior male. That is not the proper way to start the foundation of a heavy-laying strain; there must be quality on both sides. Only from superior bred-to-lay original stock can improvement be made in egg-production after subsequent matings, and it is unfair to the parents to expect highly satisfactory progeny if one side is in any way weak.

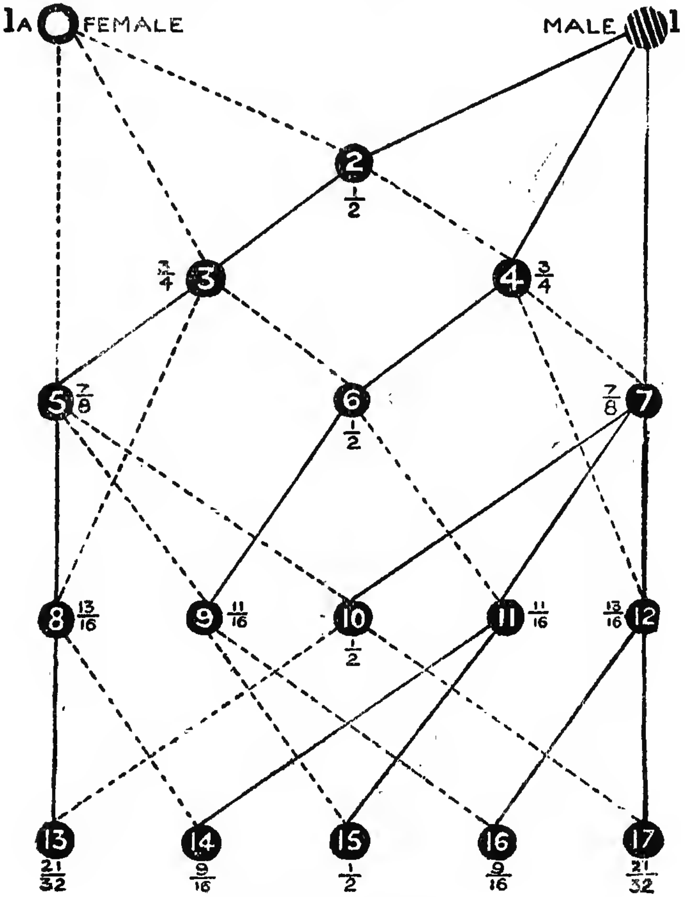
Having mated up your original foundation stock do not aim too high. Don't be disappointed if, after the first mating, you do not obtain two hundred eggs or more from any single female for the twelve months. Your best-laying duck may lay only 125 or 150 eggs, but she will be excellent material. Use the males from your best layer of the season and mate them to females with good average records. You will have one great advantage in that you will know the laying records of all the stock and can therefore make the best use of the material in hand. There will be no guesswork or haphazard matings, the latter never giving permanent improvements. It is not always advisable to exploit the heaviest layer of the season for all she is worth, although many do so. If I get an exceptional layer I use the males bred from her and take my females from those layers with records above a certain number. I thus obtain good averages all the way round and I find it more profitable and more successful to build up my strain in this way than to breed a few very heavy layers and the rest only medium. Supposing at first I had ten ducks with records for the twelve months of 200, 180, 160, 150, 140, 130, 125, 95, 90 and 85 eggs respectively. The 200-egg duck would provide me with future males and those with records over 100 would provide me with females, others below the hundred mark being discarded. The next year I should again select drakes from my heaviest layer of the season and use females from those laying 125 eggs or over during the twelve months, and each subsequent season I should work up the scale until there was improvement all the way round. I am writing generally because the system of breeding adopted must also be allowed for. I want to impress upon the reader the following facts :—(1) That you *cannot* mate a 260-egg male to a 200-egg female, add these two figures and divide by two and get progeny that will lay 230 eggs; and (2) that high flock averages all round beat high individual records and low flock averages combined.

Docility is one important factor to fix in a strain and it can be done by careful rearing and by selective breeding. Ducks are generally reputed to be nervous, but this can be more or less curbed. There is no need to be boisterous when handling ducks or to go about your business like a mad bull. I have had ducklings that have "palled" up even to a playful Airedale, so that as will be seen temperament has a say in the matter. Until we cultivate this tendency we may lose a little by way of egg-total through trap-nesting, but the eventual results will more than compensate us for that. After buying untrapped adult ducks the trap-nesting of them may for the time affect their laying, but this can be lessened if the ducks are allowed to settle down and grow accustomed to their surroundings and new owner before being trapped. For general purposes it is unwise to shift adult ducks to fresh quarters for fear of putting them off the lay or to frighten them. Sometimes their removal will throw them into a short moult, although they will quickly come into lay again. In like manner is it unwise to frighten ducklings that are being fattened. Where trap-nesting is carried out, however, we must take chances, always selecting our breeders for docility and rearing the ducklings with the same object in view. Home-reared ducks will naturally test-out more readily than purchased adults. The duck, we must remember, has not been handled like the bred-to-lay hen, and it is far from progressive to judge the duck as what it has been rather than what it can be made. If you saw a flock of Leghorns out on range you would say that it would be impossible to trap-nest them. See the same birds in a commodious Intensive house with only the regular feeder inside the structure and you will wonder at their docility. It is after all a matter of handling! The man genuinely interested in livestock will have no difficulty in installing docility within the strain.

The sex question can also be more or less fostered by selective breeding. Some strains of Runners produce males greatly in the majority and others the reverse. Individual ducks will widely differ, one throwing a greater percentage of drakes and another the opposite. Trap-nesting and detailed pedigree work will show up such individualism, and whatever points are desired must be "fixed" by selection generation after generation. It is the same with Leghorns, some strains of which are very broody (although the Leghorn is a non-broody variety), whereas the trait is absent in others.

Where pedigree work is deeply carried out it is always as well to have a policy and to hit it home every time publicity is sought by stationery or advertising. You may, for instance, specialize in the "white-egg" strain, or run such stunts as the following:—(1) Every duck on the farm is trap-nested; (2) No drake is used in the breeding pens unless his dam laid 200 eggs or over; (3) No drake is used for breeding unless his dam or (or and) sire's dam laid 200 eggs or over in her first twelve months' laying; and so on. I give these as examples, but the pedigree breeder must use his own business knowledge in all such matters. There are splendid openings for the pedigree breeder of heavy-laying ducks, but he must use tact, everything depending upon the man at the helm. A glance at the advertisement columns in the poultry papers will show that the field is not overcrowded, particularly if one compares them with those for the popular heavy-laying breeds of poultry. And we must remember that there is a very large clientele with woodland, pasture and stream throughout the kingdom to whom a flock of laying ducks would readily appeal if the advantages were pushed home to them.

Establishing a Laying Strain.—Whilst closely related to in-breeding, line-breeding in one form or other is the correct method of breeding. We do not mate brother to sister, which is *in-breeding*, but father to daughter, son to mother, etc. Line-breeding enables the duck-keeper to go on breeding year after year without resorting to any out-cross. Chart No. I will explain the system. We start at the top with a *male* and *female* (1 and 1*a*)—both unrelated. These have been selected because they possess excellent points that we wish to preserve and improve in all further stock bred. They may be tip-top utility specimens, or the duck may be the best layer on the farm and the male a son of a 280-egg mother. In following the system of breeding success will not come unless the breeder practises selective methods in conjunction as he goes along.



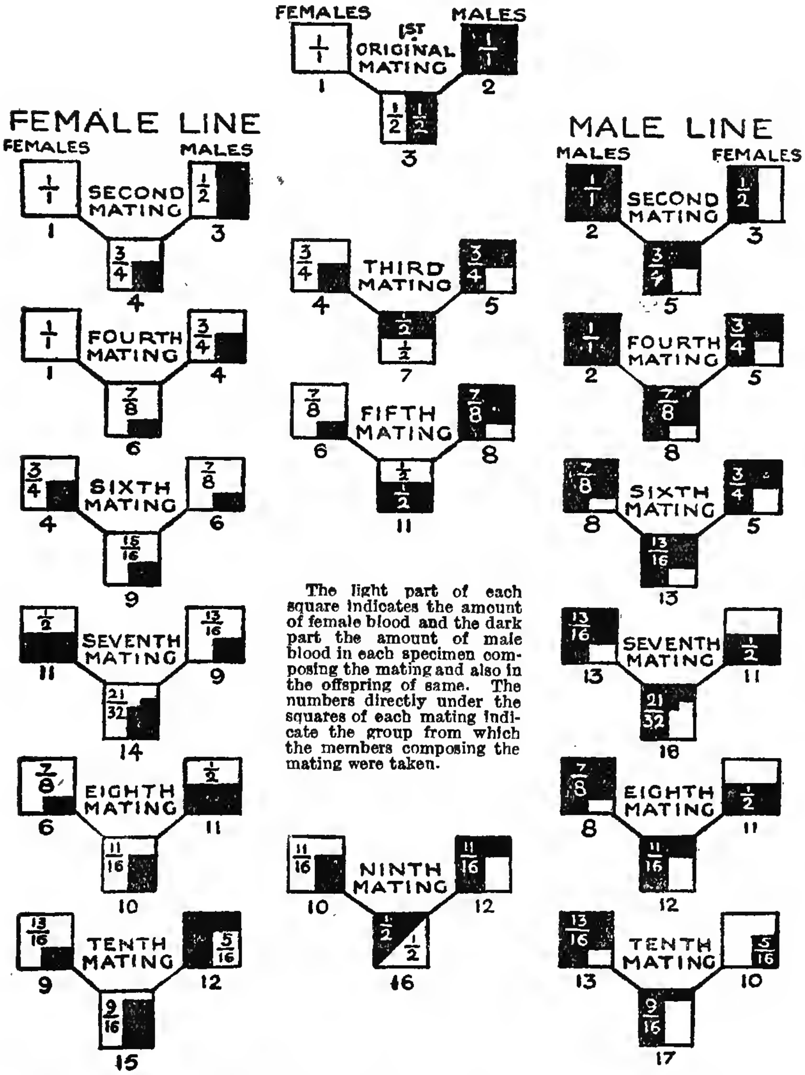
Breeding Chart No. I.

To explain the chart, we mate the male to the female, which mating gives us circle 2. Below the circles will be found the fraction of the blood of the parents the progeny in the circle possess.

Thus the progeny of No. 2 possess half the blood of the male or father and half the blood of the female or mother. The second season we mate the selected male from group 2 to the mother and the selected females from circle 2 to the father. Circles 3 and 4 are produced, each of the progeny possessing three-fourths of the blood of the parent on the side the circle appears. The system is the same throughout, each black line denoting that a male has been chosen from the group from which it starts, and each dotted line a female. Ducklings from circle 3 possess three-quarters the blood of the mother and one-quarter the blood of the father, etc. To work this out, take the original female as 1 and add $\frac{1}{2}$ as representing the female (or mother's blood). We must divide by 2 as being from two parents, and so get the $\frac{3}{4}$ at circle 3. The third year a male from 4 is mated to a female (or females) from circle 3, each containing three-quarters of the blood of the sire and dam respectively, and the progeny at circle 6 will have half blood again as at circle 2. The same formula is followed; we take three-quarters as the male bird from group 4, add thereto one-quarter as representing the male's blood in group 3 and divide by 2. *The direct object of the line-breeder should be to come back repeatedly to this half-and-half blood, and that is made possible by this system of breeding, without going outside the strain.*

A male from circle 3 is next mated back to the original female, giving us circle 5, the blood of the progeny being seven-eighths of the original female's, i.e. $1 + \frac{3}{4} \div 2 = \frac{7}{8}$. Those in circle 7 will possess seven-eighths of the original male's blood and one-eighth of the female's. Circles 7 and 5 when mated together give us the desired half-and-half blood at circle 10. If one mates a male from circle 5 (containing seven-eighths of female blood) to a female from circle 3 (containing three-quarters female blood) the males at circle 8 will possess thirteen-sixteenths *female* blood.

To help the novice still further I give Chart II, showing the female and male lines separately. Commencing with an unrelated male and female, we mate them together the first season. From the offspring the healthiest and strongest male bred from the heaviest-laying female must be selected and mated with his mother to start the "female" line. The original male is mated to selected daugh-



The light part of each square indicates the amount of female blood and the dark part the amount of male blood in each specimen composing the mating and also in the offspring of same. The numbers directly under the squares of each mating indicate the group from which the members composing the mating were taken.

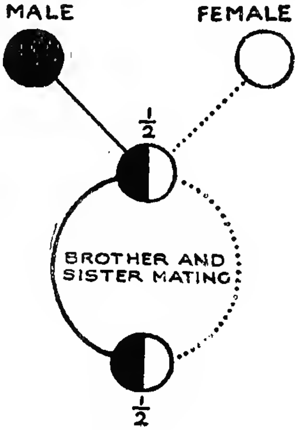
BREEDING CHART NO. II.

ters, and the male line thus started. The matings should be as per the chart previously dealt with and should read :—

1st mating F. (female) 1 to M. (male) 2
2nd ,, F. 1 to M. 3 ; M. 2 to F. 3
3rd ,, F. 4 to M. 5
4th ,, F. 1 to M. 4 ; M. 2 to F. 5
5th ,, M. 8 to F. 6
6th mating F. 4 to M. 6 ; M. 8 to F. 5
7th ,, F. 11 to M. 9 ; M. 13 to F. 11
8th ,, F. 6 to M. 11 ; M. 8 to F. 11
9th ,, F. 10 to M. 12
10th ,, F. 9 to M. 12 ; M. 13 to F. 10

The members of groups 3, 7, 11, and 16 contain then the half-and-half blood that is desired. In commencing line-breeding one can, and usually does, start with several matured ducks as one of the units, but all should be *related.* We *must* start with high-class original stock, and once heavy layers are bred others will follow, for line-breeding is not "chance" work. With line-breeding a stud-book to keep track of all ducks mated or bred is essential.

Line-breeding is often confused with in-breeding, so that I must give a brief explanation here. Generally speaking, *in-breeding* may be taken as the mating of brother to sister, which gives half-and-half blood. I have drawn a small sketch to illustrate this mating. The original male is first mated to the original female, giving progeny of half-and-half blood. By mating the brother in this progeny to his sister from the same group it will be noticed that half-and-half blood is still the result. Now, many breeders of pedigree layers do mate brother to sister *to fix a certain point, quality, or peculiarity,* but it must only be done *once in a way* if at all, and



then the stock so mated must be vigorous and healthy. If the in-breeding is continued the next generation, the progeny will be inferior. Should you try in-breeding, don't go as far as in-and-in-breeding.

There are innumerable deviations from the particular charts given, and the breeder must be guided more or less by the shaping of the strain according to the egg-records. I have had good success by mating a male from group 4 (see chart I) to the original female to produce five-eighths blood, and by mating the original male to females from group 3, the progeny also having five-eighths blood, and when the groups thus formed are mated together we obtain, our desired half-and-half. The mating from male to female side, and vice versa, tends to increase the stamina of the stock bred. The continued breeding in line tends to weaken constitution, but where one realizes this and selects the breeders always with an eye on vigour this counteracts the tendency. The main thing is to keep careful account of the exact blood of each duck or drake and know exactly what you are handling.

The usual plan of breeding adopted by the duck-keeper is too uncertain to be recommended. Starting with several ducks mated to an unrelated drake he will bring in a fresh male periodically. But as he does not use the trap-nest nothing is certain and he possesses in time a mixed flock. One mating may produce progeny of good-laying merits, whereas the next mating, when a fresh male is introduced, may spoil the improvement made. Or he may start with two unrelated pens, mating males bred from the one pen to females from the other, and vice versa. Such methods may ensure stamina, but there is no guarantee of improvement or even maintenance of heavy laying.

In line-breeding at the start the male should be unrelated to the females, although the latter should be related to themselves, being for preference full sisters. When mating back to the mother select for the purpose a male bred out of the best-laying duck.

In order to ensure vigour many breeders regularly introduce "new" blood into the strain. It is here where mistakes often occur. In the first place it is unwise to bring in a male, as he will stamp all further progeny with his blood; introduce any fresh blood by means of *females* mated to males of your own strain. You can introduce a little new blood wherever you choose so long as you keep account of the pedigree and blood-proportions in the ducks and drakes. It is very unwise, however, to go right outside the strain you are working on, as one runs risk of spoiling years of good work thereby. Having decided to introduce a little new or fresh blood buy females from the same breeder whose strain you are working with, or buy from him eggs or ducklings and test-out the resultant ducks, using the best layers among them.

Supposing you decide at group 3 to introduce fresh females purchased from the breeder who supplied you with foundation stock. From group 3 take a male bred from your best duck and mate him to the females in your new group. The blood of the progeny will possess half the blood of the *fresh* females, half of three-quarters of the mother's blood, i.e. $\frac{3}{8}$ and half of one-quarter of the sire's blood, i.e. $\frac{1}{8}$, thus making up the whole. Now take a male from group 6, bred from your best layer, and mate him to females the progeny of group 3 mated to the fresh females. You will then have in the resultant progeny ducks and drakes having in blood three-quarters of your own strain and one-quarter of the new. The three-quarters is arrived at as follows:—Half blood as in group 6, plus one-half of one-eighth sire's and one-half of three-eighths dam's from the fresh progeny group $=\frac{1}{2}+\frac{1}{16}+\frac{3}{16}=\frac{3}{4}$. You can also introduce fresh females (of same strain) with a male from group 7 and carry out the same plan, bringing the groups so formed from the male and female side together.

Where, in order to outcross, females of a totally different strain are brought in the progeny should be thoroughly tested-out before they are brought into the "home" strain. So long as you aim at stamina, hatchability and rearability you will strengthen any weakness brought about by line-breeding. The latter need not be too close because, by the judicious introduction of fresh females from the same strain, you can maintain the blood so that it is more or less three-quarters of your own and a quarter of the fresh. The former ensures egg-laying power and the latter imparts to your "home" strain a touch of vigour. Even then the progeny should be tested-out ere being brought in permanently.

Should Pedigree Strains be Registered?—When I cast my mind back to the steps in progress made by the busy little hen I am full of admiration for those who have by diligent trap-nesting, selection, pedigree breeding and strain building *made* the hen what she is to-day. My position in the world of poultry has brought me into close touch with the majority of our pedigree poultry breeders and many have from time to time sought my advice on leading points, which has been gladly given, and the results carefully tested-out. With most systems of "strain" building I am therefore well acquainted and I know that a host of poultry specialists in laying strains are conscientious and untiring in their pedigree work. At the same time I know that a very large army of poultry breeders now booming heavy-laying strains really carry out no set system whatsoever. This class has done much to injure the noble poultry industry and has been the cause of many disappointed novices leaving gaps in the ranks. We can ill afford to lose a single recruit in so great an industry which some day will gain the sympathy and practical support of the Board of Agriculture and the powers that be. It has been under lock and key for too long and one day the lid will spring open of its own accord.

Profiting by what we have learned from the pedigree hen I sincerely trust that no opportunity will be presented to those I am referring to when it comes to the pedigree bred-to-lay duck. To accomplish this, now is the time for the Board of Agriculture to step in and safeguard the interests of one and all and the duck industry. It is merely a question of honesty *versus* fraud! Here are some examples:—Jones buys a sitting of eggs from Brown, who has a 280-egg strain. To the pullets he mates one of Smith's cockerels of no particular strain and to one of the cockerels he mates some pullets bought from Johnson, also of no particular breeding. In a season or two you will find that Jones has well mixed these birds and yet advertises his strain as a 280-egg one. Now along comes Billy Novice and buys some pullets from Jones, mating them to a cockerel from Farmer Giles (price 7*s.* 6*d.*) and the progeny he also brands as of a 280-egg strain. Then Billy Novice supplies Sammy Tyro with pullets to which are mated a cockerel bought in an eastern-county market, perhaps from a "roupy" farm, and the progeny also become blessed with the 280-egg strain. I can quote a hundred such cases and go down to the breeder who uses but half-a-dozen trap-nests on the place and yet advertises himself as a leading pedigree breeder.

What, too, of the man who offers eggs from his six over-two-hundred-egg hens mated to a 260-egg male, and sells during the season of a few months over 1,000 eggs for sitting and more than 1,000 day-old chicks *all from the one pen.* Knowing as I do so much that happens behind the scenes I would like to suggest to the Board of Agriculture that they immediately take the duck under their wing—a strong one if properly used—and prevent such happenings in the pedigree duck industry. The pedigree poultry industry can also be included in the scheme.

All strains should be registered and each season a list of matings should be submitted to the Board of Agriculture's practical experts. The latter, too, should have the power to inspect books on any registered pedigree farm without notification and to visit the establishments when they choose to see that everything was above-board. Reliable pedigree breeders would welcome this because it would safeguard their interests. Any fraudulent breeders would not, and this would stop their practices. In consequence their alluring advertisements in the poultry press would stop and not catch the eye of the novice as they do now in nine cases out of ten. I may be told that it is not the business of the Government to take so drastic a step, but I answer this with a question: "Is not the Government responsible for all *National* pursuits ? "

If the Board will not move, I suggest to the various Duck Clubs that they register all strains and see that periodical visits are made to pedigree establishments. Let them, too, insist on members when advertising using the Club's trade-mark of guarantee. Let duck breeders co-operate to push my suggestions home and frame safety rules which all members on joining must sign. A general fund might be opened to enable the Duck Clubs to advertise to the public each week in all the poultry papers, telling likely buyers to support those who use the trade-mark of guarantee and explaining the rigid rules each member has to comply with.

I would like also to say a few words on duck-laying competitions which in the past have been conspicuous by their absence. How different it is across the Pond ! Here, too, the Board of Agriculture can show its real and practical interest and sympathy. I look forward to the time when a Government grant will be set aside each season for the running of duck-laying contests for the good of the industry and community. At the time of writing, the Utility Duck Club is holding a laying contest for ducks, but private breeders cannot run these contests in the best possible manner without financial support, which should come from the Government. This will come when the Board realizes that Agriculture does not mean only the growing of grass. And it is not every present-day farmer who can really grow grass ! The day when farming consisted of growing grass and snaring a few dozen wild rabbits every Friday in order to market them and pay the small wage bill ought to be forgotten. Let the Board include under Agriculture all the smaller livestock, and let there be an official census every year of poultry, tame rabbits, goats, ducks, turkeys, geese, guinea-fowl, etc.

There should be a distinction between purchased and "fixed" strains. Under the latter will come any strains that have been tested-out and pedigree-bred for at least three generations. Let the breeder adopt whatever system of breeding he likes so long as it is a *system.* I do not believe in binding him to any set form or in any way hinting at the lines he should work along. All we want is a sharp dividing line between the real and the fraudulent article.

Against Trap-nesting.—Many breeders who have voiced their opinions against the trap-nesting of ducks have given as their reason the nervousness of the duck. For the most part they have been fanciers, but surely these antagonists have overlooked the fact that if the duck is not suitable material for trap-nesting it cannot possibly be less so for show work. Yet exhibition ducks—and the Runner included—have to be washed, trained and penned, and have to be on show for several days at our leading exhibitions closeted in wire show-pens for visitors to shout at, tickle, prod with a walking stick or umbrella, and blow smoke at.

Let the "trap-nester" adopt gentle methods and use wide trap-fronts and apertures to avoid jostling. Let the nests, too, be well ventilated to prevent sweating. At the moment my experiments with ordinary wire show-pens have been very successful. At the back of the duck-house I place a series of ordinary show-pens, each provided with a special netting front (the whole width of each pen), which is fastened at the top and lifts up from the bottom. The pens are bedded down and at night the ducks are placed in their respective nests. Each duck can see its neighbour through the wires and have a friendly chat to the drake outside. Wire-netting fastened on a wooden framework would represent a suitable substitute, but each nest should be roomy.

CHAPTER IV

HATCHING: NATURAL AND ARTIFICIAL

The Hatchable Egg—Storing the Eggs—Natural Incubation—Artificial Incubation—Hatching Charts—The Incubator House—Eggs-for-sitting Trade.

IF you have been wise in your matings you will experience little difficulty in procuring the *hatchable* egg from which you will have good prospects of hatching the *rearable* duckling.

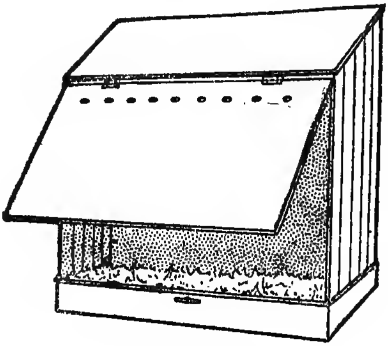
The Hatchable Egg.—Having taken pains in the selection of our breeding stock we must next select the *hatchable* egg so that it will clear the way for the *rearable* duckling. Any eggs will not do; there must be selection. Avoid abnormally large or small eggs and any that are ill shaped, rough shelled or thin shelled. The medium-sized firm-shelled eggs, produced by healthy, well-fed and properly mated parent stock, should be selected. Select the eggs too for colour.

Storing the Eggs.—In storing there is one point to remember, namely that ducks' eggs do not keep so well as hens' eggs, probably because the shells are more porous. Specially made cabinets should be used for accommodating eggs being stored, the eggs being placed therein *flat* (the natural pose) on a layer of sawdust. Turn them daily to prevent the contents from sticking to the shells. If you want strong fertility and a maximum hatch use the eggs as fresh as possible, remembering that ducks' eggs lose their fertility more or less with age. I prefer to use the eggs before they are seven days old.

Natural Incubation.—The duck has lost most of her broody instincts through domestication, and it is very uncommon now to see a mother duck and her canary-coloured brood swimming on the pond as in days gone by. The ordinary hen is used for brood-purposes, although the incubator is her deadly rival where a goodly number of eggs are being incubated. The incubator has much in its favour in that it can be used in all seasons, whilst systematic hatchings can be planned on a large scale to ensure flocks of ducklings of equal ages. A hen, too, cannot manage very many eggs owing to their size. In Bucks the broody hen is relied upon to bring out and tend the table ducklings, orange boxes being used in the main as sitting boxes. The two methods of hatching can be combined if desired, the eggs being started by the broodies and finished off in the machines. The delicate period is from the third to the fourteenth day and the broodies can take care of the eggs for the first fortnight if preferred.

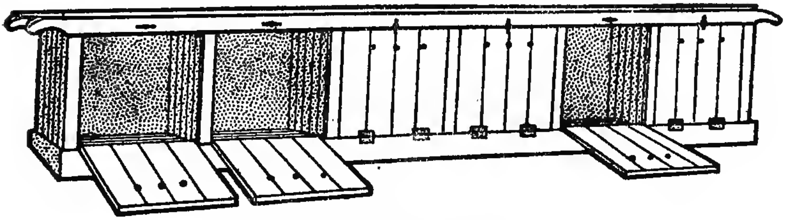
First of all make sure that the hen is really broody before entrusting her with the eggs. Secondly select one that is large, steady and sure on the leg, free from scaly legs or feathers on the legs (unless the feathers are clipped), in good condition and with ample fluff on her thighs and under her tail. She should be docile, and if her previous record is available so much the better. All hens used for broodiness should be recorded so that their good or bad points can be looked up at a moment's notice.

Broodies should not be free agents during the period of incubation. Rather is it wiser to confine them and let them off as desired, such controlment resulting in more successful hatches. An ordinary sugar-box turned on its side will make a suitable sitting-box, the lid being removed and used as the drop-door for the front. Across the bottom of the front nail a strip of wood—several inches deep—to keep in the nesting material, and to the top of the front hinge the drop-down door, securing this to the cross-piece at the bottom by means of a wooden "button." At the top of the door, and also in the back of the box near the highest point, bore ventilation holes with brace and bit or red-hot poker.



Sitting Box.

Orange-boxes—two or three compartments—make excellent sitting-boxes, the open tops being controlled by means of boards weighted with bricks and covered with sacks to keep the hens controlled and quiet. Where a number of hens are being set a range of sitting-boxes can be constructed, and when the hens are let out each can be tethered to a peg in the ground by means of a length of cord fastened to one leg.



Range of Sitting Boxes.

When preparing the nest have as a foundation a good depth of soft-sifted soil, pieces of stone being removed for fear they should break any of the eggs. Well beat down the earth with the flat hand and scoop out a little from the centre to make a saucer-shaped hollow. This should not be too deep as the natural pose of an egg is almost flat. Pack plenty of hay in the corners of the box and round the sides and well sprinkle the whole with Izal disinfectant powder to keep insects away and prevent them annoying the hen.

In the centre place hay that has been well rubbed in the hands. If straw is used this too should be hand-rubbed.

Set the broody at night, previously giving her a good feed of maize or corn and some drinking water and dusting her well with Izal disinfectant powder. By means of a bicycle or hurricane lamp show her the eggs and let her walk on to the nest, *gently* guiding her footsteps. Having allowed her a few minutes to settle down leave her shut in for the night, chalking on the box the date eggs are set and when the ducklings should appear, also number of eggs put down.

The second morning after she has been set open the door and let her walk out for a feed of maize or grain, a dusting and a drink. If she refuses gently lift her off. Place a dust-bath of ashes near the nest for her use and some clean drinking water. A daily exercise and feed will be necessary, but it should not be of too long a duration at first until the eggs are well on the way. One might start with a few minutes the first week, increasing to ten, fifteen or twenty minutes later according to the outer elements. If very cold cover the eggs whilst she is off with a piece of flannel and in all cases be guided by the feel of the eggs. Allow the hen to do her business each time as she will then be settled on returning to the nest. If diarrhœa is noticed give a few meals of boiled rice or soft food dusted with pulverized chalk. Maize is usually given to sitting hens because it keeps up the body-heat, but solid food is advisable to keep the droppings firm. Should the nest and eggs become soiled carefully sponge the eggs with *warm* water and add fresh nesting material, again sprinkling it with Izal insect powder. Midday is the best time to let broody hens off, as the temperature is then warmest.

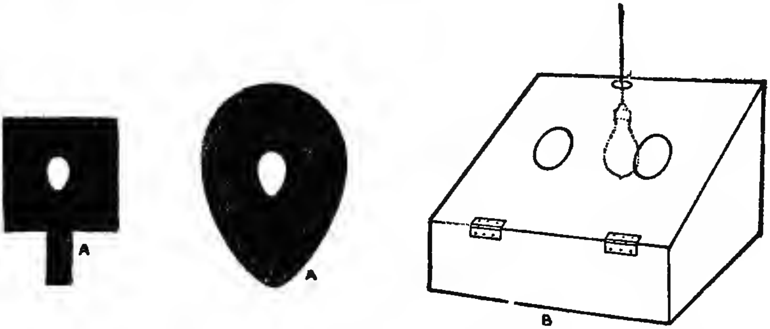
The eggs take twenty-eight days to incubate and hatching is invariably to time. Daily or every other day for the last week the eggs can be lightly sprayed or sprinkled (at night for preference) with warm water, the hen being placed back on the eggs at once to prevent chilling. This moisture will soften the inner membranes and help the ducklings extricate themselves from the shells. When the hens sit on the damped eggs sweating takes place, but in damp weather such moisture need only be applied the last few days. Many dip the finger in vinegar and pass it round the centre of each egg just before it is due to pip, this helping the duckling to break the shell. Do not take the hen off on the twenty-seventh day if any eggs have pipped; instead give her a drink on the nest. During hatching-time leave the broody to herself unless she is troublesome, when egg-shells can be removed and the ducklings taken into the house as they hatch and kept warm by the fire in a top or bowler hat lined with flannel. When all the ducklings are hatched they can be replaced at night. It is doubtful if it pays to help out any of the ducklings if their inability to break loose is due to weakness. On the twenty-ninth day any eggs not pipped can be placed in warm water and those that bob up and down will contain live ducklings. After a brief immersion in the warm water replace the eggs under the hen and see if any progress is made a few hours later. If not take the eggs into the house and holding each in the left hand give the top a sharp tap with the back of a knife, hitting the thumb at the same time to prevent the shell from denting in. Now peel off the shell gently without causing the duckling to bleed, and seizing its bill draw the little mite out bodily. Place it in flannel (in a hat) in a slow oven until it gains strength and becomes dry, when it can be placed under the broody with its brothers and sisters. Kill all ducklings that are weaklings or deformed in any way. If all the eggs are late in hatching be careful, because it may be due to their getting chilled during the incubation period. Await events, and if one or two eggs eventually pip do not be in a hurry to open the rest.

The number of eggs to place under the broody will depend upon her size, the amount of fluff she carries and the season of the year; from eight to ten eggs may be regarded as the usual number and sitting-boxes should measure 18 or 20 inches square. Test all eggs on the seventh and fourteenth days and again on the twenty-first if desired, any clear or unfertile ones being boiled and used as food for the ducklings. Many can test eggs with safety on the fifth day, much depending upon experience. Where several broodies can be set at the same time this is an advantage, as when the first test takes place on the fifth or seventh day unfertiles, broken yolks and addled eggs can be removed and the *fertile* ones shifted up. Each hen then has a full number of *hatchable* eggs and one or more of the broodies can be started with fresh eggs and the system continued. The duck-keeper should always study hen-power as well as egg, duckling and duck-power. When the hen is feeding examine the eggs to see if any are broken, and if any are cracked stick a piece of stamp-edging over the aperture, which will often prove successful in saving the duckling within. Rest all eggs that have travelled for twenty-four hours. Where incubators are in use further ducklings can be added at a day old to the brood brought off by each broody, hen-power being thus conserved. The operation should be done at night.

Artificial Incubation.—It is in all cases advisable to hatch ducks' eggs by themselves and not with those of hens as so many do. Ducks are not reliable as broodies or mothers and the incubator is usually employed where the extent warrants the same. First of all see that the machine stands perfectly level and do not be in a hurry to put in the eggs. Run the machine empty for a few days at 100°, and when this temperature is recorded and the incubator is running smoothly open the drawer to let the egg-chamber cool down. The eggs can then be placed in the machine. If cold eggs are placed in the incubator when it registers 100° the chances are that the yolks will burst.

Ducks' eggs require a slightly lower temperature within the machine than those of hens and 102° may be regarded as the ideal. Some breeders run their machines at 102° for the first fortnight and at 103° from then till the end of the hatch. Others try 101½° the first week, 102½° till the eggs begin to pip and 103½ or 104½° (and never exceeding 105°) whilst the ducklings are hatching out.

The temperature of the incubator-house should be at 60° with that in the machine at 102°, and it is customary to arrange 103° if the house-temperature registers 50° and 101° if 70°. My ideal temperature within the machine is 102° for the first two weeks at least, followed by 103° and 104° as a maximum. I have had excellent results with 102° for the first three weeks, 103° the last week and 104° during hatching-time, but the seasons must be studied and the particular machine. All the eggs should be placed in the machine on the same day, as eggs in various stages of development will mean a varied temperature. The eggs should be rested for at least twenty-four hours and the machine should never be "packed."



Egg-testing Appliances.

A. Cardboard egg-testers; B. A handy appliance that can be located in the incubator house.

In fitting up the machine be sure and follow the maker's directions in detail and use the best oil, taking care not to mix two brands for the same hatch. See also that the thermometer is directly over *fertile* eggs, or the wrong temperature will be recorded, and test all thermometers before use.

Thirty-six hours after the eggs have been in the machine they must be turned. This procedure should be carried out twice daily —morning and night—and will provide sufficient cooling. Whilst the egg-tray or drawer is out the incubator must be closed up to retain the heat and the turning process should not be delayed.

With a pencil put a X (cross) on one side of the egg and a O (circle) on the other. Turn from X to O, and vice versa, damping your finger and rolling each egg gently over, avoiding any sudden jar. At first the turning-and-cooling process should take but a few minutes, according to the outer elements, but as they get well warmed up the time can be prolonged, the operator being guided by the feel of the eggs, the latter never being allowed to get cold.

On the seventh day the eggs should be tested, all unfertile (clears) and addled (dead germs) ones being removed, also any containing broken yolks. Test the eggs at night and use a strong light for the purpose. Cut an aperture—a little smaller than an average-sized egg—in a stout piece of cardboard, and placing this near the light hold each egg up to the hole. An unfertile egg will appear transparent like a new-laid one, a broken yolk will show a thin line from top to bottom, whilst a fertile egg will contain a small dark spiderlike form with blood-vessels running in all directions. This spot is absent in an addled egg, the contents appearing as a dark watery mass which flop about when the egg is inclined. Any doubtful eggs should be marked and replaced so that they can be examined again on the fourteenth day when the second test takes place. Addled and clear eggs are best removed, as they quickly get cold and chill other eggs near them, whereas the former give off obnoxious gases which are harmful to the fertile eggs. A third test can take place if desired on the twenty-first day so that any addled eggs can be removed. At the second and third tests a fertile egg can easily be picked out, the air-space in the larger end being clearly seen and the dividing line standing out sharp and defined. The contents, too, will appear dark and "solid" and not liquefied as in the case of an addled egg containing a dead germ.

Many duck-keepers err on the question of providing moisture during the incubation of ducks' eggs. It has always been thought proper to sprinkle the latter daily or every other day with warm water, whilst not a few authorities recommend the brief immersion of the eggs daily in warm water. It is a great mistake to apply too much moisture, which invariably causes dead-in-shell, the shells of ducks' eggs being very porous. Too much ventilation should not be provided, and it is wise to fill most of the ventilation-holes in the machine with cotton-wool. The machine can be run thus until hatching-time approaches, when fresh air is needed for the live ducklings as they hatch out. The moisture trays can be filled with water from the start, although I prefer to fill them on the seventh day, and if moisture is added before, to keep a damp sponge only in the tray. During the last week the heat must be kept up and the ventilation holes can be opened, whilst every day the eggs can then be lightly sprayed with warm water, the machine being closed at once to prevent chilling. Ducks' eggs take twenty-eight days to incubate, and hatching is usually to time, although after "pipping" the shell the ducklings take longer to escape than chicks. For this reason the operator should not be in a hurry to help the ducklings out or interfere with the machine unduly during the closing stages. Some eggs may be chipped twenty-four hours or more before the ducklings extricate themselves.

The eggs should be cooled until the first one is pipped, but turning should be stopped three days or so before the twenty-eighth day unless it is only to place the chipped ones with the "cracks" uppermost. Many regard even such handling as unwise.

Fill the incubator lamp and trim the wick daily and if possible have two lamps for each machine for alternate use. Rub off the charred portion of the wick with the aid of a piece of soft paper or the finger and thumb. Do not cut the wick or an uneven flame will be the result. The lamp is best attended to in the morning as the machine can be periodically inspected during the day and it will be running well at night. Examine the machine last thing at night to see that all is well before retiring to bed. Between the hatches boil out all burners and well clean out the machines, disinfecting the interiors with a weak Izal disinfectant wash. Test the tank for leakages by blowing down the filling tube, when the bottom will be inflated if all is well. Take the machine to pieces at the end of the season, store the parts and wrap a large piece of calico round the incubator to keep the dust out, sewing the material here and there. Always have handy a stock of capsules and thermometers in case of breakages or flaws.

Hatching Charts.—Incubator charts are useful as the operator can study the records at the end of the season. Machines have their whims just as do broody hens, and I always maintain that success in artificial incubation depends very much upon "knowing the appliance" you are dealing with. One appliance will hatch well early in the season, another comes on later, so that such data must be carefully considered. The incubator should prove "detective" to the fertility of each breeding pen and each breeder, and when testing for fertility take a few eggs from each pen rather than a lot, thus conserving egg-power. Here is a good ruling :—

No. and Name of Incubator.	Pen No. and Breed.	No. of Eggs set.	Date set.	Date off.	Clears 1st, 2nd and 3rd tests.	Dead in Shell.	No. and breed of Ducklings hatched.	Percentage hatched.	Notes

Where pedigree work is carried out the hatching out of each individual's eggs must be recorded, so that hatchability can be tested prior to rearability, i.e. for both breeding drakes and ducks. Temperatures within the machine and in the incubator house can be recorded several times daily so that the records can be compared with the hatching results. Detailed work of this kind has its reward in better hatches in the future, which means a higher return financially.

The Incubator House.—Any suitable outhouse can be converted into an incubator room with a few alterations. Cellars and spare rooms are often brought into use with success. Double roof and walls with the space between packed with shavings, straw or paper ensure an even temperature within. On the south side arrange a window—one that opens—and have the house nicely ventilated so long as all apertures are controlled. A bench will run down one side whereon will be placed the machines, and a working bench will be necessary on which to fill the lamps, test the eggs, etc. Earthen floors are best as they can be frequently watered during hot weather to provide moisture, and many with this object in view arrange a narrow trench down the centre which is always kept filled with water in hot weather. In a small ante-room the oil-containers can be placed, whilst round the incubator room can be fixed shelves for small accessories. On the wall should hang a slate for notes and over each machine and nailed to the shelf should be hung a card giving the number or make of machine, number and breed of eggs set, date due, number of unfertiles, number of ducklings hatched, dead-in-shell, etc. If a porch leads up to the incubator (or brooder) house so much the better, as the door to the porch can be opened and closed ere that to the house proper is opened, thereby checking an inrush of cold air which would make the temperature drop suddenly.

Eggs-for-sitting Trade.—Where the duck-keeper is engaged in the eggs-for-sitting business he must work on business and progressive lines. A customers' book of names and addresses must be kept, also a "sittings" account book. For the latter the ruling might be :—

Order received. Date.	Order dispatched. Date.	Customer's Name and Address.	Breed, pen and number of Eggs.	Amount due.	Amount paid and Date.	Mode of dispatch.	Unfertiles returned (No. and date).	Unfertiles replaced (No. and date).	Further Details.

The pages in the day-old duckling book can be similarly ruled with the exception that *dead ducklings returned* and *replaced* will take the place of "unfertiles." Book-keeping is essential, although simple accounts are very desirable. Apart from an "expenditure" book ruled off as on p. 102 we shall need a "sales" book for receipts.

In the expenditure book all that "goes out" will be recorded; in the receipts ledger all that "comes in." In the "sales" book substitute in the example given *sales* for *expenditure* and after *particulars of* let *sales* take the place of purchases. Where sittings, day-old ducklings and stock specimens are sold it is much preferable to have in addition to the general books special and separate

Month........ **EXPENDITURE BOOK.** Year........

Date.	Particulars of Purchases.	Amount.			Notes.
		£	s.	d.	
	Monthly total £				

accounts so that the yearly profits from each branch can be quickly turned up.

The method of packing sittings will depend upon the price obtained for each sitting. Special egg-boxes can be purchased or ordinary wooden boxes can be used. Wrap each egg separately in a screw of paper, packing them *flat* on a bottom layer of sawdust over which has been placed a sprinkling of hay. Pack the corners of the box with hay and on the top of the eggs put more hay and a fine layer of sawdust. Nail down the lid securely to prevent the sawdust from working out, having previously made holes to take the nails to minimize the jarring. Label the box "Eggs-for-hatching; urgent and with great care," and in the covering letter notifying dispatch tell the purchaser to rest the eggs flat on arrival for twenty-four hours to allow the contents to settle down.

Ducks' eggs are usually sold in sittings of *twelve*, but I prefer to quote for *nine or ten* eggs, as the former is really too many for an averaged-sized hen if they are large. Where one is advertising eggs for incubation with a view to appealing to the large operator interested in table ducklings special prices can be included for fifty and one hundred eggs and so on. It is customary to replace free of charge all unfertiles (clears), these being returned within, say, ten or fourteen days. A rubber stamp bearing the name of breeder, farm, breed and number of pen should be used to mark the eggs sent out for hatching so that on being returned they can be identified. The eggs must not be broken but must be returned whole ere hatching is finished and customers should be notified of this stipulation in the breeder's catalogue under "Methods of

Business." Sometimes a breeder supplies three extra eggs to the sitting instead of replacing unfertiles. This is an advantage where eggs are sold by the dozen because with the three " extras " a man may be inclined to take the *fifteen* eggs so that he can place the number under two hens, and *thirty* eggs under three. I am surprised to see it the general rule to supply sittings in *dozens*, which is the old custom for hen's eggs. I hope to see a change when my hint has " got home " with duck-breeders reading this text-book. My students have always been taught to sell sittings of *nine* eggs each. The original plan here outlined also opens up a new and profitable channel for the professional duck-breeder, viz. the selling of day-old ducklings in *sixes* or half-broods. Supposing, for instance, a purchaser buys a sitting of nine eggs and hatches half a dozen ducklings. He or she will gladly—especially if schooled into it by clever publicity—buy (on order) six more day-olds to make a full brood, the extra ducklings to be delivered on the day the hatch is due. Although it is customary to replace unfertiles very many buyers do not trouble, merely placing the eggs under a broody and leaving her to do the rest, the eggs not being tested even for fertility. Several sizes of egg-boxes will be needed and a stock of same kept handy. Unfertiles are replaced *once* only and must be returned to the vendor *carriage paid*. Distinction must be made between addled and clear eggs, only the latter being replaced. Broken yolks are treated as addled eggs, and not replaced. The breeder can offer to replace eggs up to the twentieth day if he so desires, to allow novices to be sure of their " testing."

Sittings are generally sent by rail and the purchaser should sign for them as " not examined " so that he can claim for breakages from the railway company. The dispatch-boxes can be returnable or otherwise, a charge being placed upon them which is refunded on the return of the empties. By watching the activities of professional duck-breeders and by procuring their catalogues the novice will be able to glean helpful information to guide him in his operations.

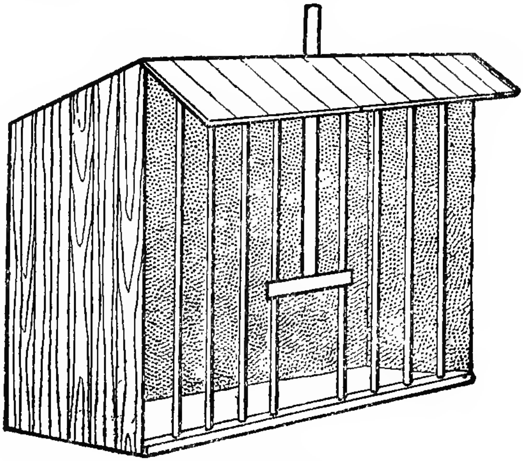
CHAPTER V

REARING: NATURAL AND ARTIFICIAL

Use of Hens—The Foster-mother—Brooder Houses—Home-made Brooders—Runs—Day-old Ducklings.

IN this chapter I propose dealing with both natural and artificial rearing, leaving methods of handling the young ducklings to table and maturity for treatment in subsequent chapters.

Use of Hens.—Where the ducklings are under the care of a hen, as is the case where but a few broods are reared, the mother-hen should be cooped for at least a week. This will ensure warmth for the ducklings for the first few days and enable them to get strong on the leg. Again the ducklings should during that period be confined to a run attached to or fitted round the coop to prevent them from wandering. A coop similar to that used for a hen and



HEN-COOP.

chicks will do nicely. The front is sparred and the centre stay is made to slide up and down so that the mother-hen can be taken out or put in as desired. The ducklings run through the space between the wooden bars, but unless the centre stay is pulled out the hen cannot get out.

I like a nice deep coop so that it affords protection for the hen, who can withdraw to the rear if there is a cold wind about. A "hinged" hood at the top will keep out the rain, whilst if the coop is placed on a dry surface no flooring need be provided, a small quantity of sifted earth being scattered over the ground. On a grass run I like a wooden flooring, particularly early in the season, the floor being lightly bedded down with peat moss or sifted earth. The grass, too, is best cut short around the coop, and more so where the latter stands if the appliance is floorless. Whilst the coop should face the south it should be shifted to fresh ground daily, and to protect the inmates the front should have a wooden slide. The latter can work along grooves at both top and bottom of the front, but a glass window must be fitted therein so that the hen can see what she is doing ere the coop is opened in the morning. This will prevent deaths through ducklings getting in the way of her clumsy feet. The coop must be well ventilated.

For early outdoor rearing a combined coop and run can be constructed under one roof if desired. The coop can be boarded in on all sides except the front, which is sparred, and instead of facing the same way as the front of the run is really towards and within the run itself. The run, too, is boarded in except for the front which is wire-netting with a hood at the top to keep out the rain. There is a trap-door at the end of the run through which in suitable weather the ducklings can pass into the outer grass enclosure. The roof to both coop and run opens separately and it can be of the apex or ordinary lean-to type. In unfavourable weather the hen and brood should be confined to an outbuilding or poultry-house with bedded floor until the ducklings are ten days or so old. Well feed and water the mother-hen.

The ducklings when hatched should be left under the hen for at least twenty-four hours, and if the hen is sitting in an outhouse or shed it will be wise in cold weather to let her mother her brood under cover there for a few days or even up to the tenth day. Coop, hen and brood can then be placed out of doors. In warm weather the hen can be removed at the end of twenty-four hours, with thirty-six hours as the next best time, the ducklings meanwhile having been previously fed. In very favourable weather weaning can take place when the ducklings are a week old, otherwise two weeks is about the time when the hen is separated from her brood. She can, however, be allowed to run with the ducklings as long as the owner cares to allow her.

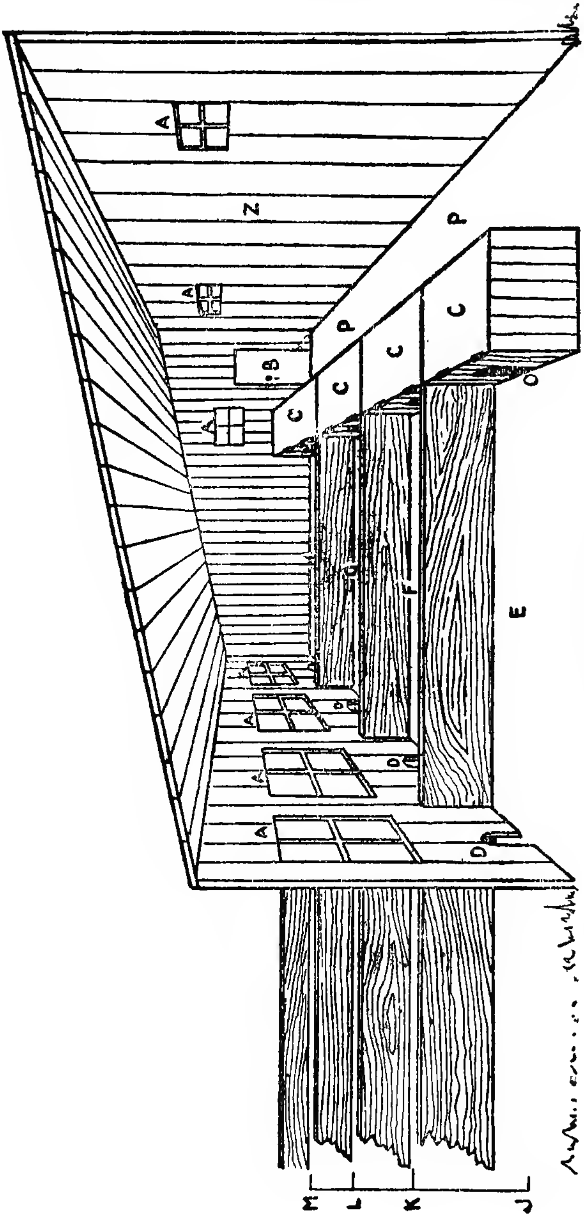
The Foster-mother.—If you are accustomed to the rearing of chickens do not make the mistake of applying exactly the same methods to the handling of ducklings. The latter are exceedingly hardy, and if the duck-keeper is careful during the most critical period, viz. from the first to the tenth day, he will soon see the youngsters romp along. Warmth is necessary for the first few days, and only experience in duck-rearing will tell the owner at what temperature he should run his foster-mother.

First of all bear in mind that there can be no set rule guiding exact temperature, as this will depend entirely upon the season and the outer elements. I have had excellent results by running the foster-mother at 90° for the first week, just as I have by arranging 90° the first two days, 80° the next two, 75° the following three days, 70° from the eighth to tenth day and 60° up to the fourteenth. Again one often does better by starting the appliance at 85°, and whilst for the first day or so maximum heat is advisable the temperature should be dropped by steps according to the weather. In warm weather ducklings will do well without heat by day after the first week, so hardy are they, 70° being registered at night when the ducklings are seven days of age, with 60° from the tenth day to the end of the second week, when no further heat need be provided even at night. Over-heated chambers must be avoided, as must over-crowding, the latter promoting sweating and weakness. In like manner prevent chills by not exposing the ducklings too long during the first week or so. If during that time they are confined to a small run or enclosure near the foster-mother that will help matters. After the first day or so err on the side of under- rather than over-heating and be very observant so that you can judge if the temperature is right by the appearance of the ducklings.

Early in the season the foster-mother can be accommodated in light and roomy outbuildings or within ordinary poultry houses, and entire weaning from heat can take place after the third week if the weather is bad. As a rule, however, ducklings get along nicely without artificial heat after the second week. When the ducklings leave the foster-mother any roomy, dry and rainproof box-arrangement will do as a cold brooder, and this can for a week or so be placed within an ordinary house or shed at night for protection according to the weather. If the foster-mother is not needed for a further batch of youngsters the ducklings can be run on therein for a few weeks longer until they are quartered in a proper duck-house or outdoor shelter. Never overcrowd, fifty ducklings in a hundred-size foster being preferable to a larger number.

The ducklings should be placed in the foster-mothers when they are from twenty-four to thirty-six hours old, and should be wrapped up when being carried from the incubator. A three-compartment foster-mother is best, as in very cold weather it is wise for the first few days to let the ducklings use only the warm chamber and the second compartment, whereas in milder weather they can have the use of the third section or covered run prior to being allowed out in the small grass enclosure. The weather conditions must be carefully watched, as chills will prove harmful as I have pointed out. The ducklings must not be fed in the sleeping chamber but first in the second compartment, later in the third and finally in the outer grass run.

Brooder Houses.—Where a large number of ducklings are being reared either for stock or table the breeder may elect to use a



Brooder House.
(See Text.)

brooder house. The illustration given is of such a structure planned for chicks and is reproduced from my "*Poultry-keeping on Money-making Lines.*" It will give the reader an idea as to how the arrangements are planned. First of all we have the hover C through which the hot-water pipes run. These pipes are directly under the lid and are furthest off the ground in the pen at the remote end. This plan enables the owner to arrange lower temperatures as the pens fall away from that next the heater in which compartment the highest degree is recorded. Graduated temperatures are necessary to allow for the increased ages of the ducklings as they are shifted from pen to pen. The hovers are usually boarded in except for the front, which is left open except in cold weather, when drop-curtains can be brought into use. The compartments are divided off by boards about a foot deep, and when the ducklings are placed in the house from twenty-four to thirty-six hours after hatching, an additional board is placed across the pen about a foot from the hover so that here little ones will learn to seek warmth. This board can be left in position for two or three days, the ducklings being fed and watered in the small enclosure so made. There is an alley-way or walk (P) at the back of the structure with an attendant's door (B) at the end and each pen has a glass window (A) in the front.

The length of time spent in the brooder house will depend entirely upon the weather. We must bear in mind the fact that ducklings call for special care up to, say, the tenth day, to guard against chills brought about by sweating followed by exposure. It is because exposure is not good for ducklings that many use a brooder house without providing any outside yards or runs. The structure then becomes a nursery. The ducklings are left in the nursery until perhaps ten days old when they pass into a brooder house with outside runs. Many divide the nursery into two sections, running a solid partition across to ensure a lower temperature in the section further from the heater. In favourable weather the ducklings can be allowed out when several days or a week old, whereas in unfavourable elements they should not be allowed to be exposed until ten days or so old, and then not for long periods. It is all a question of studying the season.

The temperature in the nursery usually graduates from 90° to 75°, and the ducklings are moved along one stage to the cooler temperature every day. The brooder house (with outer yards) follows with a starting temperature of 70°. Progression goes on until the fattening house is reached, when the ducklings are six or seven weeks old. This house is also divided up into sections, each with an outer run, and the age of the inmates of each pen is carefully noted. Before the ducklings enter the fattening house they are examined and "likely" breeders separated. The ducklings can be run in flocks of fifty, seventy-five or a hundred each and either the number can be reduced as the ducklings get older or the runs can be increased in size. The floor is usually cement and is well littered. If ordinary earth is adopted it is regularly scraped and brushed. In the chapter devoted to table-duckling rearing fuller notes will be found.

A separate foster-mother or hover can be placed in each pen if desired in place of the hot-water pipes. This will entail extra labour, but the rearer will be able to arrange the temperature in each pen according to the outer elements and the age of the inmates. The outer runs are usually from 30 to 50 feet long and the width of the inner pen.

Home-made Brooders.—Where but a few ducklings are being reared and there is no hen to mother them the owner may decide to construct a home-made brooder. This can be an ordinary box and be heated by means of a lamp or a hot-water bottle. If the latter is used it must be filled several times daily and the last thing at night, whereas with the former there should be a guard round the lamp and a hole in the lid of the box to take off the fumes. Success in rearing ducklings is readily achieved if an unheated hover is brought into use. The box should be roomy and well ventilated and the lid should have a small perforated-zinc covered opening for ventilation purposes and there should be holes bored in the sides near the top. The entrance should be in the form of hanging strips of flannel and a piece of flannel can hang loosely from the under-part of the lid for warmth if desired.

If such a home-made fireless brooder is placed under cover in a shed or outhouse ducklings placed therein will be quite at home in favourable weather, and after they are ten days or so old they can be allowed an outer run and then be cooped outside. The ducklings must be trained to enter the brooder, and for a few days a small enclosure can be erected by means of boards quite close to the hover.

Runs.—The providing of enclosures or runs for ducklings is not an expensive matter. Wire-netting—1- or 2-inch mesh—from 12 to 18 inches deep will suffice, and if movable runs are adopted the netting can be "staked." Where the ducklings are being reared and fattened in permanent sheds the outer runs usually consist of earth, the yards being scraped and brushed several times weekly. The scrapings are used on the garden and it is customary to dig the yards up and plant a quick-growing crop to sweeten the ground.

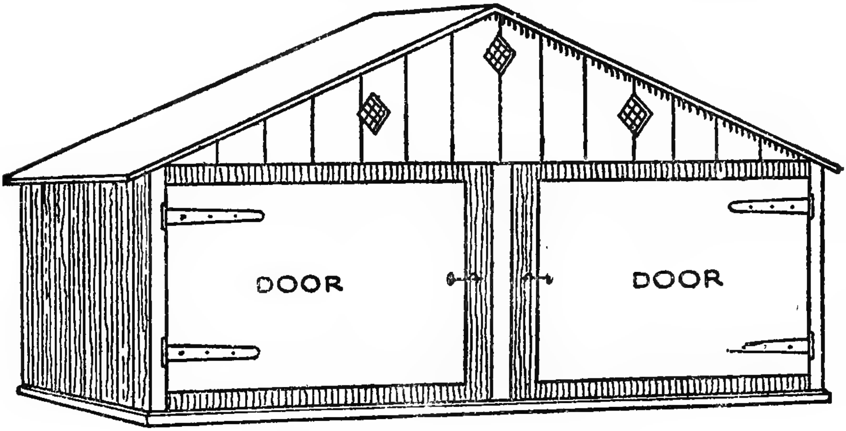
Where outdoor rearing is adopted by the aid of movable runs and coops the wire-netting is supported at equal distances by stakes driven into the ground. The wire-netting and coops are changed regularly to fresh ground which is kept in grass. The ducklings, if being reared for the table, can be run in flocks of a hundred to start with, the number being reduced to seventy-five and then fifty as the ducklings get older. Grouping can be by size. Table ducklings are best confined from the start to marketing-time and a wired-in grass run measuring 10 yards square will take a hundred day-old ducklings, and when they are six weeks old it can be 25 yards for a flock of fifty.

Where foster-mothers are used these can be placed in such wire-netting runs and the whole be removed regularly to fresh ground as the grass is eaten down. If broody hens are used smaller grass enclosures will be adopted. A run 15 feet long by 5 feet wide will be large enough for each hen and her small brood and the hen can be cooped whilst the run is moved to fresh ground. Such a run would be large enough to take a dozen or more ducklings to the killing age.

Ducklings being reared for stock should be taught to forage from an early age. If with hens they can be confined until strong on the leg in a small wire-netting enclosure fitted around the coop, the whole being moved as necessary to fresh ground and the mothers being cooped. As the ducklings get strong on the leg the hens can be released and the broods allowed to go wherever their mothers care to take them. If foster-mothers are employed a small enclosure can also be adopted prior to the ducklings having their full liberty, and then it will act as the assembly pen in which to shut the ducklings when they have their last meal of the day. In cold weather the ducklings will of course be confined to their foster-mothers and not be allowed out of doors until weather permits and until they are old enough. They will of course have the use of the third run or compartment of the foster-mother, except in very cold weather, when only the sleeping chamber and second compartment will be made available. Where large runs are used the ducklings can have free range when six or eight weeks old and several flocks can be grouped together. I like to encourage early foraging for those ducklings intended for stock where it is possible, even if the penned-up flocks have to take it in turn in having a run out. The person with but a small brooder or two will be able to let his ducklings forage from the time they are strong on the leg.

All runs should be provided with ample shade in warm weather, and this can be artificial or natural. Low fruit bushes or trees can be planted in the yards to advantage, or the orchard can be utilized as the rearing ground. Where movable runs are employed the land should be rested the next season or two and fresh rearing grounds selected. Permanent yards can be cropped as recommended.

I give an illustration of a suitable shelter for ducklings. The structure is ventilated in both front and back and can be divided in the centre by a wooden partition if desired to halve the flocks. The floor is bedded down with litter and the whole stands about 3 feet high. Where the ducklings are being reared in outside grass enclosures for stock or fattening several of these structures can be placed in each 25×25 yards enclosure. This type of structure will do for any growing ducklings or for adults or maturing ducklings out on range.



SHELTER FOR GROWING DUCKLINGS.

Day-old Ducklings.—The sale of day-old ducklings will prove a highly remunerative channel for all who possess heavy-laying strains. And those with table ducks will find a ready market for day-olds among those who rear for flesh-production. A local trade can be worked up when, by advertising dates of hatchings in the local press, there will be plenty of customers who will call for the ducklings, thereby saving transit.

The disposal of day-old ducklings should be fostered because there is good money in it, the vendor receiving double the prices of sittings. Customers will gladly buy day-olds because they are sure of having a given number, whereas with sittings there is always a lottery since so much may happen to the eggs from the time they are laid until they are incubated. Ducklings are hardy and they should be dispatched in well-ventilated boxes within thirty-six hours of being hatched. The receptacles should be labelled "Valuable Day-old Ducklings; urgent delivery; handle with care." Special attractive labels should be used for both sittings and ducklings bearing the name and address of the breeder. The buyer should be notified of the dispatch in good time and the ducklings should be sent by passenger train.

The boxes used should be well ventilated, even more so than those for day-old chicks, and a little chaff or sawdust can be placed on the bottom of each. Upon arrival the ducklings should be fed and "watered," and if any seem far from lively upon arrival they should be wrapped in flannel, placed in a hat and put near the fire or in a slow oven. A spot or two of whisky in a saucer of drinking water will also revive them. It is customary to replace any ducklings dying during transit or to refund the money for them, the dead bodies being sent to the vendor carriage paid.

There are splendid openings in the day-old duckling trade, although so far it has not been extensively taken up. Those who do not wish to keep breeding stock can, of course, buy the eggs at contract prices from the breeders under a guarantee of unfertiles being replaced. The local corn-dealer will place a brooder and ducklings in his window and take orders, and any local channels can be exploited. In addition to this agents can be appointed, and particularly where the ducklings are of a table variety, as buyers will be plentiful, requiring the youngsters for fattening-up purposes.

CHAPTER VI

MANAGEMENT ON COMMON-SENSE LINES

Shade Essential—Beware of Sudden Storms—Is Swimming Water desirable?—What of Free Range?—Food Troughs—Drinking Receptacles—Cleanliness Essential—Feeding the Ducklings—For the Table—For Breeding or Laying.

HAVING obtained our *hatchable* egg and *rearable* duckling we do not end there. The best result is possible of achievement only where each duckling is handled on common-sense lines in exact accordance with the object in view.

Shade Essential.—Shade from the hot rays of the sun is essential for young ducklings as they readily come to harm from sunstroke owing to their thin skulls. Bushes, shrubs and the like will provide excellent shade, as will growing crops. Any forage crop can be grown in the yard occupied by the ducklings to provide the necessary shade, or canvas can be fitted over light frames. It is for the first six weeks that it is very important to provide shade in the runs.

Beware of Sudden Storms.—Whilst the hot rays of the sun through lack of proper shade kill off many ducklings each season, sudden storms also claim many victims. Where ducklings are being reared the owner should always be handy so that the ducklings can be driven in under cover when a storm approaches. If the owner has to be away from the farm let him leave some responsible person in charge, giving him express instructions to drive the ducklings under cover should a sudden rain-storm come on.

Is Swimming Water desirable?—Ducklings that are being reared for table should not be provided with water to swim in or they will not make the best weights. Exercise promotes muscle, which is not desirable in the table duckling, the latter putting on flesh more rapidly when confined to close quarters and allowed to remain quiet and contented. On the other hand, ducklings being reared for stock, whether for laying or breeding, are all the better for swimming water. Whilst this is so, however, it is unwise to allow the ducklings to enter the water at too young an age because the down they carry does not afford much protection from wet. If, too, the elements are unfavourable the ducklings will upon exposure after getting wet come to harm. It is far better to rear them without swimming water until they are more or less feathered, when free range and swimming exercise will do future laying or breeding stock the world of good.

It is very nice to see young ducklings swimming on the water, and I am afraid I have often allowed ducklings at even two weeks of age to enjoy a swim, in many instances because I was amused at their little antics. If ducklings are allowed access to swimming water before they are more or less feathered let it be only in fine weather and for but short periods at a time. Again, let there be shade from the sun and protection from winds near the swimming water. I mention this because so many duck-keepers who rear but a small brood like to see the ducklings in the water at an early age. Under no circumstances should swimming be permitted until the ducklings are two weeks or more old.

What of Free Range?—Swimming exercise and free range should be denied all ducklings being reared for the table. Otherwise muscle instead of flesh will be the result and extra food will be needed to make up the loss of weight and growth. On the other hand free range is ideal for ducklings intended for future laying or breeding, as it tends towards hardiness, and a nice muscular condition. Again, where it is intended to provide free range for the ducklings when they are matured it is very advisable to bring them up accustomed to foraging.

Food Troughs.—Mash should not be thrown on the ground to become trodden on and soiled, and any left over should be removed at once and not allowed to become stale. Some breeders give the soft food on boards, others on sacks and not a few in troughs. Personally I prefer troughs so arranged that the ducklings obtain the food by placing their heads through spaces between spars or laths. A good plan is to make a sparred box-framework and to place the feeding-trough therein, the ducklings pushing their heads through the spaces. The framework has laths from top to bottom on all four sides and will be oblong in shape. For small broods one will not require a long trough, but for large flocks the feeding-receptacles can be 5 feet or more long by 8 inches deep and 9 or 10 inches wide, the depth depending upon the age of the ducklings.

Drinking Receptacles.—Whatever the type of drinking receptacle adopted for young ducklings it should be deep enough to allow the little ones to cover their heads. This is essential, as otherwise the nostrils will become blocked with food and the eyes may be affected. The washing of the bills will remove any particles of food or dirt, and the receptacle may be anything from 2 up to 4 inches deep according to the size of the ducklings.

The two main things are to provide plenty of clean drinking water and at the same time to prevent the young ducklings from swimming in it. The size of the receptacle must depend upon the number of ducklings being " watered " by it. Where only a small brood has to be catered for an ordinary earthenware basin or trough will do, a large pebble being placed in the centre to keep the ducklings out of the water. For large broods one or more large shallow drinking pans or troughs can be utilized and a framework of laths can be fitted over the top to prevent the ducklings from entering the water. They can pass their heads through the apertures to drink.

Clean water is essential, and when ducklings or ducks are out on range stagnant pools should be wired off. If it is possible to arrange a constant supply of fresh water by means of a drip-tap planned to serve the drinking vessel so much the better. If there is a running stream near the run the latter can be arranged to take in part of same for drinking purposes. The small section wired off must have a framework of laths over it so that the ducklings can have a drink but cannot enter the water until the owner deems them old enough to have swimming exercise.

Ducklings have two peculiarities when very young. They seem to insist on getting into the drinking vessel and drowning themselves, and on falling on to their backs, when they appear quite helpless. Use shallow pans so that should the ducklings fall in they will be able to get out. Vessels with steep slippery sides are unsuitable as are any receptacles that are deep unless a large stone is placed in the centre. If an ordinary jar is used one of the ducklings may fall in head first and be drowned, and so a note of warning is necessary because amateurs in a small way are apt to use any receptacle that comes handy, from a jar to a pie-dish.

To keep the yard dry it is a good plan to stand the drinking vessel on a thin-meshed galvanized wire grating so that all swillings will run through into a pit dug in the ground below the grating. This is a good plan where the yards are of earth and permanently used, and the grating for an ordinary vessel can be 24 inches square.

Cleanliness Essential.—Cleanliness is essential in both the housing and feeding of the ducklings. All interiors of wooden houses, coops, foster-mothers and fattening sheds should be limewashed, Izal disinfectant fluid being added to the limewash. Izal preparations should be stocked by every progressive duck-keeper. The litter should be renewed as desired and fresh material added almost daily to replace soiled portions removed. Outer runs should be scraped, if of earth, and brushed and accumulation of food around the feeding-trough should be removed daily. All drinking-vessels should be well scalded daily and food-troughs scraped and scalded out. The litter should be sprinkled with a weak Izal wash from time to time and be well raked or tossed. Remove all droppings daily from around the drinking-receptacle and observe utter cleanliness in all matters.

Feeding the Ducklings.—The number of meals to be given the ducklings daily must be left to the rearer's choice. Personally I prefer *five* light meals to *three* heavy ones, and so on. For the first week it is well to feed the ducklings every two hours, whilst *five* meals daily will suffice up, to say, a month, with *four* up to six or seven weeks and *three* per diem until marketing-time. Those specimens selected for stock and turned out on range at six or seven weeks should be given but two meals daily, viz., morning and evening. If the ducklings are marketed at twelve weeks they can have *four* meals per diem from four to eight weeks, and the future breeders or layers can be selected at the eighth week prior to the commencement of the fattening process.

Ducklings are free eaters and should be allowed all they will eat up quickly at a meal in, say, twenty minutes. The clear eggs from the incubator or hen can be boiled and minced up, and for the first week breadcrumbs, biscuit dust, bakers' sweepings, etc., can be mixed with the minced—or better still grated—egg. The mashes should be prepared by being scalded with hot water, and after a week cold water can be used in the summer. Coarse meals should be set to scald and bulk after having boiling water poured over them, the receptacle being covered with a board or sack and the whole allowed to stand for several hours prior to mixing with hot or cold water. I refer to bran, clover-meal, biscuit-meal, coarse meat-meal, palm kernel meal, and any of the oil-cake meals. Chopped raw green food should be fed freely both in the mash and alone (in troughs) and whilst turnips, marrows, swedes, mangels and the like can be boiled and mashed and added to the soft food it is well to give them occasionally raw, the roots being finely minced or sliced ere being added to the mash prior to the latter being wetted and prepared. From the start grit, shell and charcoal should be kept always before the ducklings in hoppers, and if some grit is placed in the bottom of a trough of water the ducklings will enjoy dipping for it and the plan will aid in the cleansing of the nostrils. The grit must vary from pin-head size upwards according to the age of the ducklings, and whilst charcoal can occasionally be added to the mash sand should always figure as an ingredient of the latter. Charcoal aids digestion, sweetens the internal organs and purifies the blood.

The main thing is to feed first for a frame and then for flesh to go on, and the use of bone-meal—one ounce to each pint of mash—several times weekly during the period when growth is most rapid will develop the frame. Bran should not be given too freely as a surfeit tends to scour the ducklings, although a little is beneficial right up to killing time to keep the bowels in working order. Animal food should be given from the second week, commencing with 5 per cent., and it can take the form of meat-meal, fish-meal, green cut bone, greaves, dried blood, meat scraps or fish offal. Meat is excellent for fattening ducks, as is fish, but it should not be continued till the end in too liberal an amount. Some of the finest ducklings raised for table have boiled minced horseflesh as the basis of their fattening mash. We must avoid flavouring the flesh of table ducklings, for which reason greenstuff should not be given too freely towards the close of the fattening process.

Ducklings require no grain, particularly those being fattened. After a month or six weeks some breeders give grain in addition to the mash to stock being raised for breeding or laying, whereas not a few, when the stock ducklings are out on range after being selected for future breeding or laying, give a little kibbled grain in the mash. Ducklings however can be reared successfully to maturity, and afterwards, without the use of grain should occasion warrant this procedure. If grain is fed it can be scattered broadcast on the grass if the ducks are on range—a fresh place being selected each time—or given in a trough of water. When scattered broadcast it provides a certain amount of exercise.

Mashes should not be fed too sloppy nor yet too dry, but a happy medium. Up to 30 per cent. or more of the mash can consist of finely minced raw greenstuff, too much of which cannot be given to ducks of all ages. Greenstuff should be fed alone daily in a trough or in water. Animal food can start at 5 per cent. and be gradually increased.

For the Table.—Ducklings being raised for the table should be marketed when they are ten weeks of age for preference, although many breeders market them at twelve weeks. When the ducklings are about ten weeks or so old a second lot of feathers make their appearance and there is a drain on the system for several weeks during which period in consequence the ducklings lose weight. The new " pin " feathers too spoil the appearance of the carcase if the best markets are being catered for. Whatever age is decided upon there should be three or four weeks' special fattening allowed. If the ducklings are marketed at twelve weeks fattening should commence with the ninth week. Where however the ducklings are " ripe " by the tenth week then the finishing process should start from the seventh week. " Hatch early and fatten quickly " is a very profitable maxim to follow. Where meat or fish is fed freely it will be found that the " pin " feathers will appear sooner. Surplus drakes not required should be fattened up for the table and cleared at ten or twelve weeks. Young drakes utter a harsh croak at that age whereas the ducks quack ; later the males develop the curly tail. Drakes do not fight, so that they can be run on with the young females as they can with those singled out for stock and placed on range, although it is preferable to keep the young stock drakes in separate flocks, particularly as maturity approaches. Circumstances alter cases and the plan that suits the small-flock duck-keeper will not fit in with the requirements of the person handling large flocks and rearing on an extensive scale.

Quietude and confinement are essential for ducklings being fattened, and sudden frights should be avoided. If confined to nicely-bedded sheds with the use of an outer run occasionally they put on most weight. And when the finishing-off process starts fattening foods must be increased, these including barley-meal, Sussex ground oats, maize-meal, potatoes, boiled rice, etc. Protection from winds and semi-dark sheds are considered by many to be essential aids to fattening during the finishing-off process. Litter should not be stinted on the floor, dry bedding being important.

To get the best results where many flocks of young ducklings are being reared for the table go through the pens directly after feeding and give a little extra food to those flocks that do not seem satisfied. An hour after each meal clear away any food left in the enclosures.

For Breeding or Laying.—There is no need to differentiate between the feeding of ducklings intended for table or stock up to the time they are six weeks or so of age. At that time the most promising ones can be selected from the flocks for future laying or breeding and be provided with free range. The others are then placed on a fattening diet. Those from the early broods will be selected for breeding and laying purposes although, of course, one must be guided by his special objective and plan of operation. From six weeks up to the time that they are placed in the breeding or laying quarters the growing ducklings should have free range as advised and two light meals of unstimulating mash daily. These meals should be given early in the morning and late at night to encourage foraging and exercise during the day. Animal food should not be given to excess and none need be included in the rations if the ducks have access to swimming water or are on excellent range where they can find plenty of insects, grubs and such natural animal foods. They should be given as much of the crumbly mash as they will eat quickly, the amount depending upon the quality of the range. It is advisable, however, to keep them a trifle on the hungry side with appetites keen.

The future handling will depend upon the objective in view. The ducks should be brought in off the range and placed in their winter quarters in good time. They should be placed on an egg-producing ration and in two or three weeks they should be laying. If new-laid eggs only are required the ducks will be penned two or three weeks before eggs are required, although where it is proposed to leave them out on range as, for instance, with small flocks of layers, this can be arranged, the ducks merely being put on to the egg-rations at the appointed time. If the eggs are required for incubation the ducks can be quartered in good time so that eggs will be forthcoming two or three weeks after they have been placed on the egg-rations. Directly they commence to lay the drakes can be placed with them, although many breeders run the males in the flocks from the start. Much better results accrue, perhaps, where the drakes are added when the ducks are in lay; failing this they should be very nearly laying. The best plan where extensive rearing is engaged in is to keep the growing males by themselves after a certain age until they come to maturity. Four or five weeks before they are required for mating, i.e. a little sooner than the ducks are specially fed for egg-production, the young drakes should be well fed into breeding condition on a more stimulating mash than they have had on range during the growing season.

Do not overfeed stock ducklings when they are out on range or they will become too fat when the time comes for them to be penned for breeding. They can have a little extra food when the "pin" feathers are growing, but once through the moult keep them in a hard and fit condition. Early in the season eggs show a greater percentage of unfertiles and matters can be helped by the use of well-conditioned breeders. If they appear to be getting too fat when out at range reduce the hand-feeding somewhat and increase the bulky green food in the mash. Grain has a tendency to fatten the ducks if fed too liberally. It is well to get the ducks penned early so that they will get accustomed to their surroundings by the time eggs are forthcoming. They do not like sudden changes either in surroundings or feeding, and when the egg-rations are carried out they should be introduced gradually, the change being spread over a period of five or seven days.

We have yet to deal with the adult ducks. After they have finished laying for the season and commence to moult they should be allowed free range, their yards if permanent being dug up and cropped and the ducks can be returned to their quarters in time for laying again at the start of the next season. In like manner adult breeding stock that have been penned should be put out on range when the hatching season is over so that they will get into hard condition once more. Surplus males can be marketed as they fall idle, either for table or stock purposes according to quality. Any quick-growing green crop can be grown in the run, and it can be cut and fed to the ducks, being cut into ¼ inch lengths for young stock and ½ inch lengths for adults.

The housing of the ducks when out at range will depend upon circumstances. They can be provided with movable shelters within reasonable distance of their swimming water, or they can be trained to come home at night to the large outbuildings near the homestead. It will depend upon the number of ducks kept, as will readily be understood.

During the moulting period a little linseed meal can be used in the mash to advantage, as can sunflower seeds, hemp and a little pea-meal or maize-meal, all in moderation however. Ducks start to moult in July, although of course it may be later according to their age. Where winter eggs are desired early moulting is essential so that the ducks can be got into lay once more after the moult. If ducks are laying when they should be moulting they will be late in moulting out and eggs will not be forthcoming early in the winter. The average duck-keeper encourages autumn laying because the eggs are handy just as hens are not in lay. Autumn egg-production, however, as I have pointed out, should be secured by special hatchings and the duck should be handled more on lines adopted by the owner of heavy-laying hens. Sparse feeding and free range will bring on the moult, as will the use of a non-stimulating mash. As the moult is well on the way extra rations can be given and an iron tonic now and then in the drinking water will tone up the system and counterbalance any strain due to the growth of the new feathers. A linseed mash occasionally will do good and plenty of green food should be included in the rations, whilst utter cleanliness in housing is very essential. If a late moult seems likely the breeder can hasten matters by first checking egg-production by light feeding of a non-egg-producing kind and by free range until the ducks are half-way through the moult when they can be more or less confined, warmly housed and protected from the elements. Good feeding will then quicken the moulting process. A strengthening tonic now and then will help the young ducklings when they change their down for " pin feathers, which is the first moult, this taking five or six weeks ere the ducklings get into good condition.

CHAPTER VII

REARING DUCKLINGS FOR THE TABLE

The Case of the Duckling—The Small Producer—Duck-farming—American Duck Plants—American Fattening Rations—English Systems—English Fattening Rations—Killing Table Ducklings—Plucking and Marketing—Feathers as an Asset.

WHILST the egg-laying duck has been sadly neglected in the past, so indeed has the table duckling. In placing before the public, therefore, the case of the table duckling I trust it will lead to increased production upon all sides. The merits of this wonderful flesh-producer only have to be known to be appreciated, and I am very sorry that an absence of official press propaganda, even in times of severe food-shortage, has kept the duckling in the background.

The Case of the Duckling.—For many years now there has been one powerful cry among producers of the smaller livestock, namely, "What is the Board of Agriculture doing?" The soullessness of the Board indeed passes one's comprehension. To Officialdom there is but one living animal worthy of attention and practical sympathy, and that is the *cow.* The claims of the pig receive consideration only after one of our most powerful newspapers starts to boom the Irishman's rent-payer, and Officialdom replies "I told you so." The hutched table rabbit is officially recognized, thanks to my recommendations and evidence before the Rabbits and Game Advisory Committee attached to the Ministry of Food. But what of the table duckling? Nothing officially is being done! Scrappy, out-of-date leaflets are useless. We need practical sympathy, and an official pat on the back for present and would-be producers.

In a nutshell the case of the table duckling is as follows:—(1) No grain is necessary from hatching to killing time; (2) no swimming water is needed, so that almost everybody can rear a few ducklings for his or her table; (3) no separation of sexes is necessary, as the drakes do not fight with themselves or the females; (4) ducklings are ready for the table sooner than chickens, and make heavier weights; (5) outlay for plant is very small; (6) all cheap, bulky and coarse foodstuffs can be turned into valuable flesh; (7) greenstuff can be fed liberally to ducklings, thereby providing an economical channel for waste from allotments; (8) ducklings are accommodating, and can in an emergency be reared for table without any cereals or grain-offals; (9) large flocks can be reared in small enclosures; (10) existing outbuildings can be utilized for fattening sheds; (11) shelters can be constructed cheaply from packing cases or sugar boxes; (12) ducklings can be weaned at a very early age; (13) rapid production is possible throughout the season, as the stocks can be turned constantly owing to the ducklings coming to the table so quickly; (14) breeding stock can be run in flocks with many males at the head of each, the drakes showing no inclination to fight; (15) the breeding stock can find most of their food on range from March to September, and in an emergency grain is not needed for them; (16) ducklings are not mischievous amongst growing crops like chickens; (17) 6 feet high wire-netting is not required for enclosures; (18) low boards can replace netting; (19) ducklings can be reared without mother-hens or artificial heat in an emergency and in favourable weather, and (20) the feathers are a profitable asset.

In any time of crisis when meat is urgently needed it is the early-to-market members of the livestock fraternity that the Board of Agriculture should support. And the duckling should be among the leaders. The nearest cut to combating any shortage of food is through a bold policy of "Every householder his own food-grower." Small producers can be a power if handled the right way, and it is shameful that nothing is or has been done by the Board to foster their patriotism and noble intentions. True, the allotment-holder is more or less encouraged to grow greenstuff and vegetables, but where is his livestock? Is the policy of the Board framed to suit the farming class? Is the Board afraid that if Mr. John Bull grows his ducks and green peas there will be a reduced call for Mr. Farmer's beef? If so the sooner the officials include among important branches of modern farming the cult of the duck, duckling, pig, goat, hutched rabbit, goose, guinea-fowl, hen, turkey and the busy little bee the better it will be for the community and the Nation's food supply.

The Small Producer.—The raising of table ducklings should be taken up by all small producers who have allotments, orchards, market gardens and small plots of grass. The weights obtained vary, of course, according to the foodstuffs available. In tests the Pekin has scaled 5½ lb. at six weeks of age, 8½ lb. at ten weeks and 9 lb. 3 oz. at eleven weeks; the Aylesbury and Aylesbury-Pekin 5½ lb. at nine weeks and 6½ lb. at twelve weeks, and the Rouen 4 lb. at six weeks and 7 lb. at ten weeks. Aylesbury-Pekins have also weighed 4 lb. to 5 lb. at eight weeks, 5 lb. to 6 lb. at nine weeks and 6 lb. to 7 lb. at ten weeks.

In an emergency, where one may not have the best foodstuffs available, weights can go by the board, as can menus, the main idea being to produce meat rapidly on waste foods that are obtainable. In normal times Sussex ground oats, barley-meal, boiled rice and maize-meal can be freely used as the basis of fattening mashes, whereas pig potatoes—boiled and mashed—may have to be substituted in times when feeding-stuffs are short. In such times, too, we may perforce have to allow range where possible for the young ducklings, and be content with smaller weights. I have seen some wonderful ducklings produced on meal and minced horseflesh, just as I have on meal and minced stinging nettles.

It is because table ducklings are very accommodating as regards foodstuffs, and because greenstuff must be fed liberally to them that all small producers with waste greenery, etc., should raise a flock or two each season. Once the crops are well up ducklings will not prove mischievous if allowed the run of the garden, which cannot be said of chickens. The growing crops, too, provide nice shade and shelter, and if turned loose among them the ducklings will soon clear up slugs, snails and the like. The little ones will need only a low shelter to sleep in, and this can be located in the garden, whilst if it is desired to confine them an outer edging of wire or match-boarding will keep them in bounds. When the crops are just sprouting the ducklings can be kept within a small boxed-in enclosure attached to their shelter, or very young crops can be boarded off without any fear of the ducklings "flying" over, as would happen with chickens. When released the ducklings will soon be off for a hunt among the partly grown crops or the potatoes, having a good feed and then resting contented until it is time for them to have another look round for grubs. After a shower of rain they will be in their glory. Those who have tried to find a flock of ducklings among the growing crops will appreciate what I write, as will those who have in mind the contented note uttered by the ducklings when discovered squatting peacefully under the foliage with their crops full after a successful run round.

Duck-farming.—There is ample scope for table-duckling farming in this country, even on extensive lines. Success, however, will depend upon the man at the helm. A small beginning is essential, and the rearer must be prepared to learn to walk ere he attempts to run. He must be prepared for long working days during the busiest part of the season, and for a small profit on each duckling marketed. The *total* profits, however, should be handsome, and if he specializes in the rearing of table ducklings only he will find that there is plenty of leisure between the close of one season and the beginning of the next. The trade can be treated as a seasonable one or can be carried on for the greater part of the year. In the former case the prices are at their highest according to plan, whereas in the latter instance low prices have to be taken with the high ones. One can cater for the London markets, which demand first-class produce at best prices, or for thickly-populated working class districts in the provinces, where a lower-grade duckling is required at of course reduced prices. The would-be farmer must naturally be located near a marketing centre, and where railway transit is good.

The planning of the farm must be carefully thought out for the very reason that labour must be reduced to a minimum. Each unit should be standardized, so that from a modest start further sections can be added once the owner feels his way. Environment must also be taken into account, for the very reason that there can be no set plan for every would-be duckling-farmer. One man, for instance, may be able to run breeding stock to supply his machine with eggs, whereas another may be compelled to buy his eggs for incubation or purchase ducklings. There must be a systematic plan of graduated rearing from shell to market, and the openings are splendid.

An American table-duckling specialist who markets 70,000 Pekin ducklings a year considers that fifty breeding ducks should keep three 200-egg machines going, and produce from 2,000 to 3,000 ducklings each season, such a unit to be what one man can look after. Everything of course depends upon the man in charge and on his experience.

If eggs are purchased for incubation from local duck-breeders make sure that the parent stock are healthy and well mated and buy the eggs under contract, making provision in the agreement about the replacing of unfertiles. You may be able to buy throughout the season at a fixed all-round price per hundred eggs or at monthly prices. Unfertiles may be replaced once only or continuously, according to the terms arranged upon. In any case be sure and adopt a proper form of agreement binding both parties and see that the various items agreed upon are included therein. It might be well to try eggs from a number of duck-breeders prior to entering a contract with the one whose eggs are most fertile and yield the most robust ducklings.

An abundant supply of green food must be arranged for by the duck-farmer, a point that must not be overlooked. Use tact, feel your way first, and above all save labour by planning each unit on labour- and time-saving lines.

American Duck Plants.—It will prove of interest and help to my readers if I give here brief descriptions of well-known American duck-rearing systems.

On Long Island some 400,000 ducklings are produced annually for the New York market. The Island is suitable for the business, there being ample shade under the low thick-set shrub oak and underbrush, which require no planting. Both salt and fresh water is available, and Pekin ducks represent the leading speciality. The leader of the Long Island table duckling industry has made a fortune from the enterprise, and on his farm ducks have been reared continuously since 1859. This breeder markets 70,000 ducklings annually, and all eggs are washed prior to incubation. Six men are employed, and the majority of the ducks are sold when eleven or twelve weeks of age. A mammoth incubator holding 36,000 ducks' eggs is installed, which is heated by hot-water pipes—flow and return—that extend throughout each tier of compartments. The consumption of fuel in the coal-heated hot water boiler is regulated automatically by thermostatic action. The ducklings are raised in brooders, and never go out of the small pens of the brooder houses and fattening sheds until killed for market. The farm is located on sandy soil.

The Pennsylvania table duckling industry comes next to that of Long Island, and the New York markets are again supplied. One of the largest duck plants covers some 140 acres, and 70,000 ducklings are reared thereon per annum. This rearer makes full use of his woods, running therein flocks of equal ages, each pen containing 400 ducklings on their way to the table. They are marketed ere they drop any wing-feathers, because they lose weight when the shedding of these takes place. Straw is used even in the runs, and it is removed regularly for manurial purposes. Five hundred breeding stock are kept accommodated in houses measuring 30 feet by 15 feet, and throughout the winter these breeders have free range and two meals daily.

On most of the farms there is ample swimming water, the runs usually bordering a stream, although in a number of cases there is only well-water and no swimming accommodation. On such a fifty-acre duck-plant I have in mind the breeders are located in a nice shady orchard on grass, the manure greatly benefiting the latter. The ducklings are reared in brooder houses each 500 feet long and accommodating from nine to eleven thousand ducks.

It will be interesting to have a brief description of the system practised by the breeder—born in Glasgow—who originated the Pekin table-duckling industry in America. At first he introduced his produce by distributing it freely among well-to-do families of Boston and its suburbs, starting with but thirty Pekin ducks, from which were marketed during the season 1,500 table ducklings. The incubators are run at 102° for the first two weeks, and then at 103°, whilst a little moisture is used after the eighteenth day, with more ventilation towards hatching-time. The eggs are cooled a little once each day after the first week. The ducklings are not fed till after they are thirty-six hours old, when they are given four meals daily—as much at a time as they will eat up clean. In cold weather they are kept a little short to encourage them to exercise. The ducklings are kept in flocks of one hundred (although seventy-five is considered better) and bedded down till ten days old with hay chaff or cut straw, when sawdust is used. The quarters are kept dry and clean both inside and out, and shade is provided. Water is not kept by them continuously, but placed in the pen at feeding-time. At ten weeks old the ducklings are ready for market.

The breeders are then selected from the early hatched specimens, the largest and choicest being chosen. It is argued that those ducklings hatched in the cool temperate weather of the early spring are better grown and matured than those reared in the extreme heat of the summer. The ducklings singled out for breeders are turned out to pasture or placed in large grass enclosures and fed on bran, Quaker oats, meal and grit. About November 1 they are quartered for winter work. About August 1, after the old birds are through laying and beginning to moult, they are turned out to pasture, the yards being dug and sown to barley. This green food is finely minced and added to the mash, and the cropping disinfects the ground. By the time the ducks are placed back the crop has been cut. Each yard is 100 feet long, and the same width as the pen in the building. In some instances the runs are arranged fan-shape to make them larger.

Green rye is relied on largely for green food in the winter. As the yards are emptied of ducklings rye is sown. Cabbages and clover hay are also fed, and it is maintained that plenty of greenery is necessary for strongly fertilized eggs. Fifteen per cent. of green rye is added to the mash.

The Pekin is bred pure, this breeder not believing in crossing the variety which he finds can lay at four and a half months of age and contribute to the egg-basket for nearly ten months with but little intermission. Two thousand ducklings are hatched early, from which the choicest and largest are selected for breeding purposes. These are turned out in large yards of three-fourths of an acre each, about 200 ducks being kept in each enclosure. They are fed lightly on meal 1 part, bran 2 parts and Quaker oats 1 part morning and night, with a lunch of maize and oats at noon. Grass range and shade are provided, and ducks and drakes are separated. In November these ducks are placed in their breeding yards and fed so that they will lay early. They have with this object in view meal, bran and Quaker oats in equal parts, with the addition of boiled turnips, green rye, cabbage and clover, and ten per cent. of beef scraps. By the end of November eggs are forthcoming, and from then till the following August 1 each duck averages about

140 eggs. The first eggs are not very fertile, but fertility increases rapidly till by January the eggs give excellent hatches.

When the ducklings are thirty-six hours old they are placed in brooder houses, and at about ten days they are let out if fine in the middle of the day. At first they are fed on one part finely-chopped hard-boiled eggs and four parts breadcrumbs with a little coarse sand added, and after a few days greenery is given. Four meals are given daily till the ducklings are six weeks of age, and then three. At eight weeks they are fed three-fourths maize-meal and more scraps are added whilst they are being fattened. At ten weeks each pair of well-fattened Pekins is expected to scale 12 lb. The yards occupied by the ducklings are swept once or twice weekly, usually before a storm, and the sweepings are spread evenly over the grassland, ensuring a better crop of hay.

In some seasons over 50,000 surplus eggs are sold for incubation. Early eggs are aimed at, as the early duckling is the best money-bringer, and as such eggs must be available in the winter the ducks are then confined to their buildings during inclement weather. Overfeeding with highly concentrated foodstuffs is avoided, as whilst a large number of eggs may thereby be procured fertility will be low. In the autumn for winter use green rye, turnips, small potatoes, cabbages and clover hay are gathered in. Thousands of bushels of roots and tons of clover hay are procured to supply the demand, the breeders being fed sparingly with foods abounding in protein or albuminoids whilst they are kept a little on the hungry side to promote exercise.

The ducklings are left in the incubators till they are thirty-six hours, when they are placed in the brooder house. Unfertile and slightly "turned" eggs from the incubators are boiled hard and fed to the ducklings, at first with the addition of breadcrumbs and 5 per cent. of very fine gravel or coarse sand. The food is scattered on a board upon which the ducklings (when very young) are placed, so that they will readily learn the art of feeding. A temperature of 90° is recorded in the hover nearest the heater, and this first section accommodates the "just-hatched" ducklings. They are started in flocks of 100 and gradually shifted to the end of the building as they get older, the temperature in the compartments being lower as the ducklings get further from the heater. The flocks, too, are reduced in number when they are removed, and remain in the first compartment, which registers 90°, for only a few days. Pipes run through the hovers, and the height from the ground to the pipes under which the ducklings nestle is about 3 inches. The distance is increased towards the other end of the building away from the heater to ensure a lower temperature. Whilst water is given to drink only at feeding time up to six weeks, after then the ducklings are allowed drinking water between the meals in addition.

It takes a vast amount of food for such an establishment, as will be gleaned from the fact that it is customary on the plant in question for the 1,100 head of breeding stock to receive about fifteen bushels of mixed food at one meal. With the brooder houses full and the plant at full capacity it requires 760 buckets of mash-mixture per diem for ducks and ducklings. Each bucket holds an average of twelve quarts, bringing the daily total of mixed food up to 285 bushels. From February to August about 200 ducklings are marketed daily.

To describe yet another American table-duckling ranch: The laying ducks are quartered in houses 16 feet wide and of different lengths—30, 60, 70, 120 and 200 feet respectively—whilst a number are 11 feet square. The interior of the 120 × 16 feet house is divided into pens about 18 × 12 feet, with a walk along the back wide enough for an attendant and a wheelbarrow. The indoor partitions are about 2 feet high, and in the front of the structure there is a window to each pen. Hay is used as a bedding, and each compartment quarters thirty Pekin ducks and six drakes. There is an outer yard to each pen measuring 100 feet long by 18 feet wide, being enclosed by 30-inch wire-netting. Low nests are located near the walk so that the eggs can be conveniently collected, and in the winter a box of coarse sand and crushed oyster shell is kept inside each indoor pen, as are the food-troughs, so that the attendant can easily attend to them. The nests are bedded with hay, so that the eggs laid will be clean and therefore need no washing before they are incubated. The outer runs are sown with rye about August 1 to purify the land and to furnish green food, the ducks being turned out to pasture and moved frequently to fresh grass land. The latter benefits very materially. Young ducklings selected for breeders are also put out to pasture and fed lightly throughout the summer.

On another establishment with 500 breeding ducks and eighteen 600-egg incubators 21,000 ducklings are hatched during the season, and when in full order the weekly weight of grain is about 14 tons. The daily requirement of the 500 breeding ducks is reckoned as five bushels of grain and one barrel of turnips, besides green food. The food is mixed with the hot cooked vegetables, one 30- and one 60-gallon kettle being used for boiling up the vegetables and heating water. Two men and two boys attend to the feeding, and in all fourteen persons are employed on the farm in the season—from May till September. The farm is given over to the growing of vegetables and greenstuffs for the ducks, 500 bushels of turnips, 100 bushels of carrots, as well as rye and green maize, being grown, whilst 200 head of cabbages are used in the season.

Whilst the owner can get his young ducks into laying condition early the drakes do not give best fertility results, he finds, much before the New Year, so that he plans to have eggs at this time. As breeders he selects ducks weighing 8 lb. at maturity and drakes 12 lb. These are selected in July from the April-hatched youngsters, and only from those that were raised from matured stock. Depth of keel, size, weight and plumpness are the guiding factors in selecting these Pekins for stock, and the chosen are placed in large yards with grass range and exercise. They are fed with more growing food than is given to the fatting stock, the ration consisting of equal parts of middlings, gluten feed and ground oats, with 5 per cent. of beef scraps. They receive two meals of this daily, and are mated up by November 1. They are then placed in the laying houses, each flock having the use of a yard 100 feet by 20 feet. Meanwhile they receive twice daily a mash of equal parts middlings and ground oats, with 5 per cent. of beef scraps. During the summer and early fall those youngsters reserved for breeding are not housed at night, but have the protection of an open roomy building just for shade and shelter.

About Christmas these breeders, owing to grass and green rye being no longer available, have a mash of equal parts middlings and maize-meal with 10 per cent. of beef scraps and one-fifth part of boiled vegetables—beets, turnips or carrots—cut up in a root-cutter and cooked in a boiler. Cut raw cabbage and raw turnips are also fed two or three times weekly, the cabbage being cut in a root-cutter and the turnips in a bone-cutter. An estimate for each duck per annum is averaged at 150 eggs, and often as many as 460 eggs have been recorded from 500 ducks for the day.

The houses for the laying ducks are 85 feet long by 18 feet wide, 6 feet high at back, 4 feet in front, and 12 feet at the ridge. They make excellent winter quarters, being divided into pens 20 feet by 15 feet with a 3 feet gangway along the back. In the front there is a window to each pen, also a trap-door, and in the back of each building there is a window for ventilation purposes every 20 feet. In the summer the windows are removed and the apertures covered with wire-netting, and when the house is cleaned out the litter is thrown through the front windows for removal. Sawdust is used as the bedding, and hay in mid-winter. During the laying season the ducks are confined in the house till 9 o'clock in the morning and make their nests in the sawdust, no nesting-boxes being provided. Where the ducks are provided with yards or runs the manure is regularly scraped off the surface and removed and rye or some other crop grown in the enclosure each season.

On most of the Pekin duck establishments the matings are one drake to five ducks and five drakes to twenty-five ducks, those with swimming water, however, reducing the proportion in favourable weather to one drake for each six or eight ducks. The breeding stock are placed in their quarters about November, the long breeding houses being often planned with a passage up the centre. On each side of the centre walk there are compartments measuring 10 feet square, whilst each has an outer run 10 feet wide by 100 feet or more long, the swimming water, if any, being at the bottom and wired off into sections.

The ducklings are placed in brooder houses at 90° for the first two days or so, and at first a board is placed about a foot from the hover and right across the pen to keep the ducklings near the warmth. In this small section they are fed and watered after thirty-six hours. After a week some breeders shut the ducklings away from the heated hovers in the daytime, and as soon as possible get the ducklings into cold brooder houses, which are also divided into pens and provided with outer runs 100 feet long to carry fifty or a hundred ducklings, according to their size. Sawdust, chaff, shavings, cut straw and peat moss are used as litter for the floors of the inner pens.

Quite a number of the American duck plants are splendidly planned. Visitors are not often invited to inspect them because quietude is considered an essential with ducklings being fattened for the table. Fright causes a loss of weight, and is carefully guarded against at every turn. The ducklings, however, soon grow accustomed to the attendants. One thoroughly equipped plant I have in mind consists of eighteen acres, three of which are given up to a fine fresh-water pond which supplies water range for the breeding ducks in late summer and autumn, and also furnishes power for a mill on the plant where the duck-mash is mixed by machinery and power cutters used for cutting fresh greenstuff to the proper size for feeding. A windmill pumps water into two large tanks, from which drinking water is piped all over the plant. A gasoline engine is used for pumping when there is not sufficient air to run the windmill. All the watering in the breeding and brooding houses is done by drip faucets located above shallow drinking pans. The latter are placed on heavy wire screens located over small boxed-in holes in the earth floor for each pen. Surplus water escapes, and the idea keeps the runs dry. During the breeding and growing season water is provided only for drinking purposes.

When dry the ducklings are placed in the brooder house, and in cold weather kept close to the pipes for a few days to become accustomed to their quarters. The brooder house is kept at a temperature of 60° to 70° in cool weather with 90° under the hover. No heat is applied in warm weather. After a few days in suitable weather they are allowed a run-out into a well-shaded yard wherein rye is being grown for shade. These yards are freely seeded down to rye, the latter being encouraged to provide shade in hot weather. When the ducklings are old enough to know that sawdust is not for edible purposes this material is used for litter. As the ducklings grow they are transferred to a cold brooder house, and from there to the fattening houses, which are unheated and provided with good-sized runs and ample shade. They are placed in these houses at seven weeks in flocks each of twenty-five to fifty, and are ready for the table at ten weeks.

Practically all the green food used is grown on the farm, and with a stock of some 750 breeders—penned in flocks each of twenty-five to thirty, and with one drake to each five ducks—nearly 18,000 ducklings are marketed between February and September. The incubator capacity is 8,000 eggs, the incubator room being 30 feet wide and 50 feet long and provided with ten windows. The fattening sheds are roofed-in open shelters, having no sides or ends. The space on both sides and beneath the fattening sheds is divided into wire-enclosed yards to take flocks of twenty-five to fifty ducklings each. The plant is lighted by lanterns at night to keep the ducklings quiet and to prevent stampedes that might follow the sudden appearance of shadows caused by a moving light. Ample shade is provided for ducks of all ages, full use being made of small trees, shrubs and brush. At the close of the breeding season in July all ducklings selected for stock from the early broods are placed on range and fed lightly twice a day on mash. Adult surplus breeders are fattened and marketed or sold as breeding stock. A speciality is here made of selling ducklings at two or three days old, a branch that is not widely supported by the Pekin breeders.

I will describe the nursery, brooder house and system in use on a successful Long Island establishment. The nursery is set on posts 4 inches above the ground, the space inside being filled with earth up to the sill. The front or south side is 4 feet high, and the rear 6 feet with a width of 10 feet and a length of 100 feet. In the front some 12 inches from the bottom a glass window, hinged at the bottom, is fitted to each pen. The 10 feet of width is divided into 3 feet at the back for a walk, 2 feet for the hover and 5 feet for the pen. A water-jacket stove is located in a walled pit at one end, and from the heater run two 1½-inch flow and two return pipes side by side 10 inches above the ground and with a gradual rise of from 4 to 6 inches at the end opposite the heater. At the extreme end of each loop and from the upper side a piece of gas-pipe rising perpendicularly almost to the roof is fitted to allow any accumulation of air to escape. This pipe is open, and by the air escaping the circulation is not checked. An expansion tank is fitted above the heater.

This 100 feet house is divided in the centre by a wooden partition with a door thereto, the idea being to maintain a lower temperature in the lower half. This lower section is divided into twelve pens 4 feet × 5 feet, the partitions supporting the pipes. The rear of the hover next the walk is boarded in and boards 2 feet wide and the length of each pen are placed on the top of the pipes. The front of the hover is left open except in very cold weather, when a curtain is hung over the front. The top section of the nursery is divided into eleven pens, there being 8 feet of space for the heater. In this part of the building the temperature under the hover is run at 80° to 85°, which means about 75° in the pens; whereas in the lower part the temperature is 75° to 80° under the hover and about 65° to 70° for the pens. The temperature is maintained at uniform degrees to prevent chilling, and in the summer no heat is provided. The thermometers under the hovers are surrounded with wire-netting to prevent ducklings from lying against the bulbs and causing a false reading. Hovers and pens are bedded with an inch of shavings, chaff, cut straw or dry sand. Everything is warm, and even the drinking water has the chill taken off it.

When the ducklings are thirty-six hours old they are removed to the nursery, being carried in a box or basket which is well covered with blankets to prevent chilling. When placed in the hover a board is placed a foot in front of the latter across the pen, so that the ducklings will not wander from the warmth for several days. They are fed and watered in the small enclosure. The drinking vessels are rinsed out at each feeding-time and the pens kept dry, fresh bedding being added and the whole renewed as necessary. At the end of five days the ducklings are removed to the lower or cooler half of the nursery, and at the end of another five days they leave this for the brooder house. No outer runs are provided with the nursery, only the inner pens. The ducklings are kept at least 8 inches below the pipes.

The brooder house, into which the ducklings go at ten days of age, is a double one with longer and wider pens. The building is 22 feet wide, which allows 2 feet for each hover (i.e. 4 feet) and 9 feet for a pen on each side. The hovers are kept at the beginning at a temperature of 65°. The pens are 6 feet wide, whilst outer yards are provided, some 30 feet long by 6 feet wide, with 1-inch wire-netting divisions 18 inches high. Water is pumped into a large tank, and a regular supply is allowed to drip into each drinking receptacle. In the morning the ducklings are fed before they are allowed to drink heavily. At the end of five weeks the ducklings are moved into unheated buildings or sheds, where they are protected from storms and kept dry. At the end of seven weeks they are placed in the fattening sheds. The floor is well bedded down and the roof rainproof, whilst each building is of the double kind 24 feet deep with a 12 feet by 14 feet pen on each side of the centre. Each pen has an outer run 14 feet by 40 feet, these yards being arranged in both front and rear of structure. Most of the fattening sheds in general use have no sides or ends, but on this establishment the front and rear (sides they might be termed) consist of a series of doors which remain open except in cold weather or during storms. It is the rain that must be prevented from beating in.

The ducklings are killed at nine weeks old, and range from 4½ to 6 lb. dressed. The food-mixing room is placed where the mixing trough can be pushed out on a truck and along an alley between the ends of the yards where a man with a shovel can feed both sides very rapidly. By the tank system of water pails have not to be carried, and an engine and mill are employed for grinding grain, cutting greenstuff and pumping water. Water for swimming is not provided, although there is a pool in the yard next the killing-house wherein the ducklings are allowed to wash themselves two days before being killed. This cleans the feathers and makes them more saleable.

When the growing ducklings are six or seven weeks old, and before they are placed in the fattening sheds, the breeding stock is selected. The chosen specimens are allowed free range and fed lightly twice daily in order not to encourage too early laying. In mid-November they are placed in their breeding quarters in flocks of twenty-five ducks and five drakes. Each breeding house is 12 feet × 12 feet and 8 feet high in front, sloping to 6 feet at back. At the side there is a door for the attendant, whilst in the front each structure has a 3 feet × 3 feet sliding window with a 2 feet × 3 feet (length) drop-door through which the ducks pass to and fro. The ducks are allowed to lay in the litter, no nests being provided. To keep the litter dry the ducks are watered and fed in the yard, The houses are built in pairs, and each is provided with a run 40 feet long by 30 feet wide. A large outer yard or run is considered of no advantage for breeding stock unless it is so extremely large that the ducks cannot keep down the grass. The latter is not considered necessary, as it is found preferable to supply the green food in the mash. Breeding ducks lose all desire for exercise, it is contended, the liberal feeding which is necessary inducing laziness except for two hours before feeding-time, when the ducks begin to make their wants known. Regular feeding is practised—sunrise and sunset until the days grow too long, when six o'clock at morning and night is selected. A hog pen is kept near the houses, all waste food being scraped up and carried there. Sweepings from the food-store, all discarded eggs and scrapings of surplus food from the brooder-houses are also converted into pork.

On one establishment the ducklings remain in the heated brooder house for from three to five weeks, when they go into the cold brooder house for about two weeks, although very early in the season they remain there until marketed. This cold brooder house is 175 feet long by 12 feet wide, and is divided into pens 10 feet square to take a maximum of a hundred young ducklings in a flock. This breeder has registered the following weights for one of his Pekin ducklings: Out of the shell, 2¼ oz.; week, 3 oz.; two weeks, 5½ oz.; three weeks, 7½ oz.; four weeks, 1 lb. 3 oz.; five weeks, 2 lb. 6 oz.; six weeks, 3 lb. 12 oz.; seven weeks, 4 lb. 12 oz.; eight weeks, 6 lb. 2 oz.; nine weeks, 7 lb. 4 oz.; ten weeks, 8 lb.; and eleven weeks, 9 lb. 3 oz. To obtain such weights, however, the duck-keeper would need to be fully experienced and to have at his command the best material and foodstuffs.

American Fattening Rations.—On many of the Long Island table-duckling plants the fattening food consists of maize-meal, 2 lb.; bran, 1 lb. and flour, 1½ lb. The ducklings are started on egg and breadcrumbs until a week old, when they receive bran and maize-meal in equal parts by weight, with just enough flour to make the whole sticky. Ten per cent. of meat is also added, with boiled fish as an occasional substitute, but fish is discontinued two or three weeks before killing-time. Another popular fattening ration consists of equal parts of maize-meal and bran, 16 per cent. of beef scraps, 5 per cent. of shell and sand, and enough low-grade flour to make the whole sticky when moistened.

On the Pennsylvania plants a popular ration consists of (*by measure*) bran 4 parts, middlings 1, beef scraps ½, a little sand and shell and a little fine salt. When two weeks old the ducklings have maize-meal ½ part added to the above, which is increased during the last ten days of fattening. The day after hatching the ducklings are fed three times daily, four times till ten days old and until killing-time thrice daily. Water to drink is always available, the troughs being placed behind a slotted or sparred fence so that the ducklings cannot get into it. Barley, rape and maize are also grown, being cut green and fed daily in troughs or finely minced and added to the mash before feeding. Many breeders feed the ducklings every two hours the first day, four times daily when they are a week old, twice per diem when six weeks and upwards, although some breeders give but two meals per diem after ten weeks. Not a few leave food before the ducklings all the time for the first day or two. The mash is usually fed on boards—2 feet by 6 feet or 4 feet square—laid upon the floor of the pens, and tracks are often built through the yards on which to run the food-cars to save labour. Stale bread is highly valued, being given in some cases dry for the first week. It is not uncommon for a duck-rearer to collect as many as 2,000 stale loaves weekly.

On one American table-duck establishment the feeding programme for the ducklings is as follows :—*First four days :* four meals daily, as much as they will eat up cleanly in twenty minutes of a mash consisting of (by measure) bran 4 parts, maize-meal 1 part, low-grade flour 1 part and fine grit 5 per cent. *Four days to four weeks :* four meals daily (all they will eat up) of (by measure) bran 4 parts, maize-meal 1 part, low-grade flour 1 part, grit 3 per cent., and finely-ground beef scraps (well scalded) 5 per cent. Finely-cut green clover, rye or cabbage is fed freely. *Fifth to sixth week:* four meals daily (all they will eat up quickly) of (by measure) bran 3 parts, maize-meal 1 part, low-grade flour 1 part, fine grit 3 per cent., beef scraps 5 per cent., fine oyster shell 1 per cent. and a liberal amount of finely-cut green food mixed in the mash. *Seventh to eighth week:* three meals per diem of (by measure) equal parts of bran and maize-meal, low-grade flour 15 per cent., beef scrap 10 per cent., green food 10 per cent. and grit 3 per cent. Oyster shell is kept always before the ducklings. *Ninth to tenth or eleventh week* (i.e. till marketed): three feeds daily of (by measure) one-half maize-meal, equal parts of bran and flour, beef scrap 10 per cent. and grit 3 per cent. Oyster shell is kept before them, and green food is given less freely until within ten days or so of marketing, when it is omitted altogether. The ducklings are watered at feeding time and all mashes are given dry and crumbly. As the ducklings are weaned from the brooder house they go into fattening sheds and yards till ready for the market, unless they are selected for breeding purposes, when they are put out on pasture or range. Under this plan of feeding Pekin ducklings have weighed 6 lb. at nine weeks old, 7 lb. at ten and eleven weeks, with 9½ lb. *dressed* for a drake when ten weeks old.

One highly successful American table-duckling rearer runs his machine at 102°, and does not supply moisture until the eggs begin to chip, when one water-pan is placed in the incubator. When the ducklings are dry and can stand they are taken out of the egg-trays and put in the bottom of the machine, where they are left for from twenty-four to thirty-six hours without food or water. They are then placed in the brooder house under the hot-water pipes and fed and watered immediately. For the first four days they receive a mash of bran 2 parts and maize-meal 1 part, merely prepared with cold water or skim-milk. Afterwards they receive equal parts of maize-meal and bran, and 8 per cent. of beef scraps. The latter is gradually increased until at three weeks of age they receive 15 per cent., which carries them to the marketing-time.

Here are some helpful notes on the breeding and rearing plans adopted on another farm where over 20,000 ducklings are sold for the market from May till September : During the winter one drake is provided for every five ducks, and after June 1 one is sufficient for ten females, half the drakes being then removed. The breeder of whom I write considers Pekins very nervous, and in their endeavour to dodge a shadow at night will jostle each other and cause undue excitement till morning. He keeps a large lamp burning in the laying house each night and another in the yard to prevent such mishaps.

A 600-egg machine is filled every other day and twice during the day at hatching time those ducklings that are dry are put beneath the trays. Twenty-four hours after they are removed to the brooder house where they are immediately fed and watered with rolled oats and breadcrumbs. Their bills are dipped in a pail of water, and each duckling is then placed upon the feeding-board which is covered with the breadcrumbs. A quantity of the latter adheres to each one's bill and the little beggar soon shows a desire to eat. As soon as they have dined they are placed under the hovers, which register 100°, the temperature being reduced to 80° by the fourth day. The ducklings are fed on the above ration for a week, having five meals daily, and the very early ducklings are fed on rolled oats and sweet milk until they are two weeks old, and sometimes longer.

At three weeks of age the ducklings receive four meals daily of equal parts of middlings, gluten feed and ground oats with 5 per cent. of beef scrap, the whole being made to stick together by means of low-grade or "red dog" flour. The food is given in wooden troughs 8 inches deep, 9 or 10 inches wide and 5 feet long. Green food is given daily. At eight weeks of age the mash consists of four-fifths maize-meal and one-fifth low-grade flour with 10 per cent. beef scraps, and this is given thrice daily. Once a day, too, they receive all the green maize or clover—finely minced—they can eat, and lettuces are grown especially in hothouses, as these are so beneficial. Skimmed milk is also included in the fattening menu.

Another method of fattening consists of equal parts of rolled oats and biscuit crumbs with chopped egg and grit added for the first week; equal parts of rolled oats, biscuit crumbs, maize-meal and bran, with 5 per cent. meat, 5 per cent. chopped green food and grit for next two weeks; equal parts of maize-meal and bran with 5 per cent. meat and green food as before till the eighth week, and two-thirds maize-meal and one-third bran with 10 per cent. meat for the final fortnight.

Quite a common system is to give for the first week equal parts of maize-meal, bran and coarse flour with 10 per cent. of coarse sand; thence till eight weeks equal parts of same meals but with addition of 10 per cent. beef scrap, 12½ per cent. green food and 10 per cent. sand, and for final fortnight maize-meal 2 parts, bran and flour 1 part each, with 12½ per cent. each of green food and beef scrap or meat-meal and coarse sand as before. Milk is given in the mash and not to drink, as it gets into the ducklings' eyes and causes soreness.

On one 17,000-duckling establishment the ducklings receive for two weeks (by measure) maize-meal 2 parts and middlings 1 part with 10 per cent. grit (fine oyster-shell and sand) and 10 per cent. meat-meal. Up to seven weeks 15 per cent. of cut green food is added to the above. To killing-time they have (by measure) maize-meal 2 parts and middlings 1 part with 10 per cent. meat-meal and 10 per cent. grit. No green food is given during the fattening process.

On another plant the ducklings at thirty-six hours are placed in the nursery, and for several days a board is fitted across the pen a foot from the hover, so that the ducklings will learn to seek the warmth. In this enclosure they are fed and watered, and for forty-eight hours food is left before them day and night, after which time four meals daily are provided at regular hours, viz. 6 and 10 a.m. and 2 and 6 p.m., but not before daylight or after dark during the short days. The nursery mash consists of (by measure) biscuit or stale breadcrumbs 1 part, middlings 1 part, bran ½ part and 5 per cent. grit, the whole being moistened with water or milk and given in a dry crumbly state. The food is placed in flat troughs although in some cases it is placed on sacks, which are taken away after each meal and kept clean. Accumulation of filth round the drinking fountain is removed daily to prevent sickness caused by the ducklings eating any stale food, etc. After they leave the nursery for the brooder house at the end of ten days they are given four meals daily, consisting of (by measure) bran 4 parts, middlings 3, maize-meal 1, cut green rye or cut clover 3; 5 per cent. sand and 5 per cent. meat-meal. This is wetted with water, but not fed sloppy. At the end of seven weeks the ducklings go into the fattening sheds and receive a mash consisting of (by measure) maize-meal 2 parts, middlings 2, bran 1, greenstuff 1, 10 per cent. meat and 5 per cent. sand, which is fed in a dry crumbly state. At nine weeks they are ready for market. Troughs are scraped and scalded out daily, and drinking vessels are kept scrupulously clean, and in the morning the ducklings are fed before being watered to prevent heavy drinking on empty stomachs and colic and cramp that might otherwise ensue. Dried blood is often used instead of meat, and crushed dry bone, oyster shell, and coarse sand are kept in all the pens except the nursery.

In some instances the ducklings are placed out in an alfalfa or clover field in wire-netting runs, a roll of netting 150 feet long making an enclosure for from seventy-five to a hundred ducklings. The netting (1-inch mesh) is supported by stakes driven into the ground, and is changed to fresh ground every few days as the ducklings eat down the alfalfa or clover. In conjunction with this method one successful table-duckling rearer starts the ducklings when twenty-four hours old with a mixture of biscuit or bread crumbs 5 parts, hard-boiled egg 1 part and a little fine grit. After four or five days the mixture consists of equal parts of bran, kibbled oats and maize, 5 per cent. meat-meal, grit and chopped greenstuff. This mixture with addition of more meat and all the chopped clover or alfalfa (lucerne) they will eat is continued until fattening time.

In a test with seven Pekins and nine Rouens the ducklings received for the first two weeks equal parts (by measure) of maize-meal, bran and middlings, the mixture being scalded with hot water and given five times daily. Afterwards the ration consisted of (by measure) bran 2 parts and middlings 5 parts, with grit and sharp sand in a vessel of water and water, for drinking only. The seven Pekins weighed 39 lb. at six weeks, and the nine Rouens 36 lb.; at ten weeks old the weights were 59½ lb. and 63 lb. respectively.

English Systems.—The raising of ducklings for table represents a very old English industry, but it has for generations been confined to the Vale of Aylesbury. Why this should have been so is hard to understand. In and around Aylesbury—the county town of Buckinghamshire—whence the famous Aylesbury duck received its name, almost every little cottager rears a number of ducklings each year, and from this county alone the London markets have been accustomed to draw in a year over £30,000 worth of Aylesbury table ducklings. The trade has always been in the hands of small producers who would collect eggs from the farmers after Michaelmas, contracting for them at a fixed price for delivery from then to the following June. They hired broody hens at 3*s.* 6*d.* each, and set them in orange boxes for the most part. When hatched, four or five broods were placed together, so that every hen had from twenty-five to fifty ducklings under her care. The youngsters were accommodated in every room in the house—bedrooms included—the various mothers and broods being separated by boards placed on edge. Chopped egg and bread-crumbs represented the first food, then chopped egg and boiled rice mixed with meal, and later meal and rice with boiled greaves and greenstuff as required.

As sanitary legislation eventually had something to say about this indoor rearing the Aylesbury "duckers" reared more of their ducklings out of doors in pens with slight shelters, although many broods still occupied the ground floors of the dwelling places. Incubators attracted a few of the more progressive rearers, but in the main the hen predominated, and whilst a few kept their own breeding stock it was customary as always to buy the eggs from farmers. The ducklings were marketed often at eight or nine weeks old, then weighing 4 lb. each, and were never kept beyond the eleventh or twelfth week, when they scaled about 6½ lb. each. All had a three or four weeks' special course of fattening, and the ducklings were marketed when eleven or twelve weeks old, just before they moulted into their adult plumage. If one allows the pin feathers to grow the ducklings begin to lose weight, and both quality and price are reduced. Early hatching has always been considered a *sine qua non*, the best prices ruling from January to March, with a drop from April to July, although many continue to market produce into September. The spring duckling, however, is the ideal, and whilst Pekins and Aylesbury-Pekin crosses now receive attention the pure Aylesbury has not lost its popularity. The ducklings are marketed in "flats" or crates, and as much as 24*s*. has been received for a couple of "ripe" ducklings, although the average in March is about 14*s*. a couple, the rearing to eight or nine weeks being reckoned in normal times as costing 1*s*. 6*d*. to 2*s*. per duckling.

The Aylesbury duckers will rear up to 2,000 ducklings during the season upon an acre of ground, although the latter is usually employed only for six months and is then cropped to sweeten it. The farmers supplying the eggs allow their breeding ducks free range, and the contract price may be 3*s*. 6*d*. per dozen taking the whole season through, or several times that amount in December if there is no contract. Quite a common method of rearing is to have a large shed about 10 feet wide divided into compartments 6 feet or more in width and each taking fifty ducklings. As these get older the compartments are wider. Boards measuring 18 inches high are used for divisions, over which the operator can easily step. There are yards in front to accompany each inner compartment.

One cannot say that duck-farming for table has taken on over here, but many plants have been run with great success. Let us take the case of the most successful rearer. Starting with 2,000 ducklings the first season, he has increased his produce until it now exceeds 35,000 table ducklings per annum. No breeding stock are kept, the eggs being purchased from the local farmers, and the Aylesbury-Pekin cross is favoured, as the best class of trade is not catered for like it is in Bucks and Beds. Eggs for incubation are also bought from distant places, Ireland included, and the farm comprises 285 acres with a clay-loam soil. In ordinary times the eggs cost 1*s.* 6*d.* to 2*s.* a dozen all the year round. He relies upon incubators, and no water is placed in the trays, the eggs being damped every time they are cooled.

When the ducklings are hatched they are placed in a small brooder house that is fitted with circular pipes, under which the ducklings are placed in trays and kept there for two days. Each brooder house accommodates 1,000 ducklings. They are then removed to foster-mothers which are kept in the open and at a low temperature. The ducklings are here hardened off, and on the tenth day they are divided into flocks of 100. Large packing cases, each 30 inches square, and with hinged door, are used for the houses, and two of these are placed in each run of about 20 feet square. As the ducklings grow another box is added, or two to prevent overcrowding. The runs are divided by temporary partitions of 1-inch meshed netting about 1 foot deep. At first the ducklings are allowed out only at feeding time, being driven into their houses after each meal to wait for the next. This is to prevent undue exposure at an early age.

At six weeks the fattening process commences, and the ducklings are placed in flocks of fifties in larger runs about 25 yards square each and divided by wire-netting as previously described. Several boxes are placed in each enclosure. The ducklings average 60 lb. to the dozen at nine or ten weeks, and whilst water is provided to drink there is none for swimming and exercise. At the close of the season the boxes and netting are removed and the ground allowed to rest for three years. A different piece of land is utilized the next year, and as it is kept in grass the manure brings on a luxuriant growth the first year of resting. Many thousands of geese are also fattened up about Christmas-time and the duck and goose feathers bring in several hundreds of pounds yearly. After six weeks in favourable weather no houses are provided, the ducklings running in flocks of 100 in enclosures 25 yards square and sleeping in the open air.

On another English duck-plant the ducklings are bought from the farmers at an age not exceeding five weeks and up to August of each year. They are bought as follows: January to March, one day old; April, 1st week, one week old; 2nd week, two weeks old; 3rd week, three weeks old; 4th week, four weeks old; May, 1st week and onwards, five weeks old. In normal times the contract price paid was one shilling each. When delivered the ducklings are placed in enclosures each formed by a 50-yard roll of netting—2-inch mesh and 18 inches deep—and in all seasons after the age of a month they sleep in the open. Up to four weeks they have small sheds as accommodation, and in rough weather canvas is hung on the netting to provide protection. A hundred and sometimes 200 ducklings are placed in each enclosure, where they are kept for a week, when the run is shifted to fresh ground. The used ground is then rested for five years, and a luxurious growth of grass is secured owing to the manuring by the ducklings.

Many fatten the ducklings under cover. A large structure is used with a 3-foot walk down the centre and pens on either side each with an outer run. The structure is one continuous brooder house, where the day-old ducklings are accommodated at one end and the ten or eleven weeks old ducklings (ready for market) at the other. The inside pens measure 6 feet by 6 feet to start with, and gradually get larger until they are 12 feet square, each compartment taking up to fifty ducklings. The latter are shifted up each day from the nursery to the cold brooder section and then to the fattening section, all three being under one roof and separated by a wooden partition with an attendant's door therein. The structure can be of any length. The inside pens are divided by boards some 18 inches deep, and whilst many arrange earthen outer yards, growing a crop therein each season to freshen the soil, not a few select cement floors, which are regularly washed down. During the fattening process, where cemented yards are employed it is customary to allow the ducklings access to same only at feeding and watering times and directly afterwards to drive them gently into the shed where the pens are bedded down with litter. To the latest compartment there is an artificial pond for the ducklings to have a wash and clean their feathers prior to being killed.

English Fattening Rations.—The Aylesbury duckers in many cases use chopped egg and breadcrumbs at the start, followed by chopped egg and boiled rice mixed with meal, and later meal and rice mixed with boiled greaves (or other cheap meat) and green food as required. Rice has always been considered ideal during the latter part of the fattening process, and barley-meal and maize-meal are also freely used. Large quantities of tallow greaves are used, mixed with meal or rice. "Paddy" rice with the husk on is usually employed, as it is cheap.

The system adopted by our most successful table-duckling rearer is as follows: *First week:* Hard-boiled eggs (chopped fine) and breadcrumbs, with a little bran added the last two or three days and the whole slightly moistened with milk. All "clears" or unfertile eggs are boiled up. *Second to sixth week:* Barley-meal, bran, middlings, oatmeal and a little maize-meal. The food is prepared by steaming, but is not always given hot, and meat is added from the second week. *To killing-time:* During the fattening process the ducklings have maize-meal chiefly, and fat with bran added to keep the bowels in order. For the first seven days the ducklings are fed every two hours, whilst they have five meals daily until they are four or five weeks old and three feeds per diem afterwards. For the first week the ducklings are kept to their brooders except for a few minutes' run-out at each meal-time. Brooders and coops are whitewashed regularly each week, overcrowding, shortness of warmth during a cold night, over-heating and sweating in the brooder followed by too much exposure are carefully guarded against during the first week.

The system of feeding practised by another duck-breeder is as follows: Barley-meal 4 parts, middlings 3, bran 2, maize-meal 1 and greaves one-eighth part by bulk. The food is thoroughly mixed and prepared crumbly moist and it is kept always before the ducklings. It is put down upon the ground, or upon sacks, and whilst drinking water is provided the ducklings do not have as much as they can drink. The water is placed in tins about 6 inches deep, and it is contended that the more they drink the less they eat. No swimming water is provided. The Aylesbury-Pekin cross is favoured, and weights secured are 5½ to 6 lb. at nine weeks and 6 to 7 lb. at ten weeks, when they are killed. The ducklings are killed by breaking their necks, when they are plucked immediately and shaped on flat boards with the breast downwards.

Many table-duckling rearers in Bucks and Beds give chopped hard-boiled eggs and breadcrumbs or biscuit-meal moistened with skim milk or water for the first three days. Boiled rice is added for the next three days, when the mash consists of boiled rice, barley-meal, middlings and greaves. For the final three or four weeks boiled rice with one-fourth its bulk of boiled greaves is used as the basis of the mash with the addition of middlings and barley-meal alternately. The rice pudding is prepared by adding three quarts of water to each quart of chicken-rice, the whole being allowed to simmer but not boil until the rice has absorbed all the water.

Other fattening rations in use include:—

(1) Sussex ground oats 3 lb., barley-meal 1, greaves or fat 1,

clover-meal ½, maize-meal 1, palm kernel meal 1; (2) middlings 2 lb., maize-meal ½, boiled greaves ½ and rice (boiled) 1; (3) boiled potatoes 2 lb., middlings 2, barley-meal 1, greaves ½; (4) Sussex ground oats 2 lb., middlings 2, maize-meal 2, melted fat ¼ pint; (5) barley-meal 2 lb., middlings 1, greaves ½, skim milk; (6) boiled whole maize 2 lb., potatoes 2, middlings 3, Sussex ground oats 2, greaves 1; (7) minced fresh horseflesh (boiled) 1 lb., barley-meal 2, bran 1; (8) boiled potatoes 3 lb., palm kernel meal 1, clover-meal 1.

Killing Table Ducklings.—On most of our own duck-plants the killing of the ducklings is by dislocation of the neck. Directly the duckling is killed it is hung up by one of its feet for five or ten minutes. A good plan of killing, and one most useful for larger poultry which really *take some killing* is as follows: Obtain a heavy piece of iron up to 3 feet long, and having placed the duck's head underneath place both feet on the bar, one on either side of the duck. The legs of the latter will be grasped in the operator's hand with the duck's back uppermost, when a sharp pull will dislocate the neck instantly. It is a good method for the fair sex to adopt.

There are of course many ways of killing a duck. Some breeders stun the duck by means of a heavy blow on the head, when a sharp knife is inserted in the roof of the mouth just below the eyes to sever the arteries of the throat. To whiten the flesh the carcase is hung head downwards for a few minutes, to allow the blood to drain into the head and neck. If the neck is to be dislocated hold the duck with the legs in the left hand and with the right hand grasp the head. A steady downward pull and an upward jerk will dislocate the neck where it joins the head, and by suspending the carcase for five or ten minutes the blood will drain from the body into the fracture. Prior to being killed the ducklings should be fasted for at least twenty-four hours. Do not catch the duckling by the legs but round the neck, and a bent hook fastened at the end of a thin stick can be used for the purpose.

Plucking and Marketing.—Plucking should commence quickly after killing, as the process is then more readily accomplished. The operator should sit down and hold the duck over a receptacle to catch the feathers, the head hanging downwards therein. The feathers should be left on the lower half of the neck and on the last joint of the wing. Keep coloured feathers from the white ones and the down from the feathers, as the down and white feathers are the most valuable and should be marketed separately for the best prices. Stubs or partly-grown feathers can be removed by means of the thumb and a blunt knife. Hairs can be removed by singeing, and the feet and bill can be washed.

To facilitate plucking some rearers damp the feathers or damp the fingers, whilst others dip the carcase in hot water for a few seconds and then rinse it in cold water. After plucking the placing of the carcase in cold water for an hour or so removes the animal heat from the body and adds to its keeping powers.

To shape the carcase twist the feet and wings forward and backward until they rest on the back, next place the ducklings side by side breast downwards on a table or shelf with their heads hanging over. Then place a board on the backs of the ducklings with weights on top to flatten the breast. Leave the carcases in the shaper until they are quite cold. Shaping gives the carcase a plumper appearance.

If the best markets are being catered for grade the carcases into sizes ere marketing them. The ducklings can be packed in flat hampers or boxes close together, and with breasts downwards. There should be two layers of ducklings in each hamper, with a layer of straw at the bottom and top and between the two rows, but with grease-proof paper between the straw and the carcases.

If a retail market is catered for the ducklings are usually singed, and then drawn and trussed.

The methods of killing and marketing table ducklings in America are naturally different to those employed here. On one plant the pluckers receive fourpence for each duckling dressed, and a good worker averages from forty to fifty ducks a day. The ducklings are dry picked and then cooled and blooded in an ice-water bath. Around the sides of the cleaning and dressing room are located small pens in which the ducks wait their turn. The pickers sit in the middle of the room, beside a large box to receive the feathers. Only the soft downy feathers are saved, these being cleaned. The ducks are stuck in the mouth, bled and brained to loosen the feathers. Any fine down that gives trouble through the duckling being unripe is shaved with a sharp knife. The carcases are picked clean except for the tips of the wings and the neck for a short distance below the head. Heads and feet are left on and entrails in, and after the animal heat has been removed in the ice-water bath the wings are tied close to the body with a piece of twine passed round the middle of the carcase. The ducks are shipped to market in heavy returnable boxes, holding from twenty-four to thirty-six each and weighing some 40 to 50 lb. By the use of iced water for chilling purposes it is contended that half a pound or more is added to the weight of each duckling.

After plucking, many American breeders place the ducklings in a tub of clean water for several hours, ice being kept therein. This removes the animal heat, and makes the carcases plump. They are then placed in a barrel with 6 inches of ice on top, the receptacle being covered with a piece of cotton cloth and dispatched. The feet and head are left on, and the carcases are undrawn.

Feathers as an Asset.—Great care is taken of the feathers from the ducks on table-duckling plants, the returns for same being relied upon to cover expenses of labour, etc. As much as £250 is realized for feathers in a season. The down should be separated from the feathers, and white feathers should be kept apart from coloured ones. Quill feathers are usually discarded.

The American table-duckling raiser also regards the feathers as a valuable asset. On one plant where only the soft downy feathers are saved these are placed in a large well-ventilated loft and cured. They are spread out on the bare boards and turned over occasionally by means of a "brush-fork" made out of a small birch sapling, with the short bare twigs left on the small end. The feathers are turned every day or two by simply stirring them up and brushing them into the air. Two windows are located in the loft, and the feathers, when stirred, are carried to the end opposite the windows. Two shillings a pound is received for these downy feathers, and each duckling averages about two ounces of feathers when ready for market at ten weeks of age.

Whilst correcting my "proofs" news comes to hand from an American poultry-fancier friend that last year the leading duckling-raiser on Long Island marketed 115,000 table ducklings and realized for the feathers alone no less than 8,500 dollars. Duck feathers, I am told, are there fetching 2*s*. 8*d* per lb., and the breeders pay 2½*d*. for each duckling to be plucked. In New York State alone duck farms planned on the "factory" lines already mentioned must number three figures, with the annual produce in ducklings running into seven figures. Incubators each holding from fifteen to twenty thousand eggs are now replacing those machines taking from two to four hundred, and the tendency is to mix the foodstuffs by power instead of hand, and to transport the food to the pens in cars propelled by power.

In ordinary times American producers received from 10*d*. to 1*s*. 3*d*. per lb. for the table ducklings wholesale, and most of them are banded together more or less co-operatively. Their produce is sold through a commission agency, which pays high dividends, as the producers themselves are the sole shareholders.

CHAPTER VIII

FEEDING AND FORAGING

Good Eaters—Green Food Essential—When on Range—Careful Study necessary—Feeding for Eggs—Is Grain necessary?—Some Essentials—First-week Meals—Follow-up Meals—On-range Rations—American Rations for Breeders—Laying Rations.

THE feeding of ducks of any age is an exact art, and yet when fully mastered success is swift and sure. This is so because the duck lends itself to common-sense handling and feeding, responding very freely with either flesh or eggs according to what is desired.

Good Eaters.—I am not going to say that the duck is a large eater or I shall set up a controversy. I will merely hint at it, but add that any and every kind of food can be used to bulk the soft food, and that on good range the duck will find most of its food during a greater part of the year. Where the ducks are on range of an excellent kind only one meal—to welcome them home at night—will be necessary from March to September, but that must be an ample one. Ducks in confinement will eat quite twice as much as fowls, but the duck easily beats the hen as regards its accommodating ways in regard to foodstuffs and feeding. All manner of foodstuffs can be utilized for the duck, even more so than the hen, particularly as regards waste greenstuff, wild plants, scraps, etc. To the person with a nice market garden, allotment, or small holding, or one who can grow green food for the ducks, duck-keeping should appeal.

If the birds are confined three meals daily will be necessary although the midday feed should be only a light one. The evening meal is always the most important and should be the heaviest, and many allow twice as much food for tea as for breakfast. Mash can be given for breakfast and tea and the midday meal can be either a scattering of grain or cut greenery fed in a trough of water. Occasionally grain can be fed in the morning instead of mash, or a reduced amount of mash can be given, followed by a little grain as make-weight, scattered over the run or in a trough of water. Over-feeding should be avoided, although one can give plenty of food if it is of the right kind without fattening the confined ducks.

Ducks on range can have three meals in the winter and one from March to September. That meal can be mash and be given at night. One cannot give exact amounts, as this will depend upon the breed, age, and quality of range available. The ducks will soon start quacking if they are being badly treated. For ducks in lay the evening meal should be as much as they will readily eat up, for the very reason that they lay at night or early in the morning and the full meal aids egg-production on that account.

Green Food essential.—Ducks require a nice bulky mash and green food can be given *ad lib.* provided it is nice and succulent. This is one great redeeming feature in that it allows us to make use of cheap and coarse foodstuffs and waste. Young ducklings do well on a ration that contains 30 per cent. of greenstuff and adults can have up to as much as 50 per cent. Even ducklings that are being reared for table can have plenty of greenery except for the last week or so prior to marketing, when it is advisable to give it in moderation. You have all heard of watercress-fed, and celery-fed table ducklings, and I have tasted fine ducklings that were fed mainly on stinging nettles with a little meal added.

In the winter clover-meal will be found useful as a substitute for green food and all kinds of roots can be utilized. Sometimes the roots can be boiled and at other times merely cut up raw and added to the mash or scattered in a trough of water. Those who have garden waste of any kind will find it just the material to bulk the mashes, and any quick-growing crops grown for pigs can be made full use of. Those readers who have my following text-books will find therein complete data on foods and feeding :—"*Pig-keeping on Money-making Lines*," "*Rabbit-keeping on Money-making Lines*" and "*Poultry-keeping on Small Lines.*" In the pig-keeping volume the growing of green crops is fully dealt with, in the rabbit-keeping text-book wild plants are also covered, whilst in the poultry handbook the subject is treated generally.

When on Range.—If the adult ducks have free range they should be let out early in the morning after laying, and have a nice full mash at night. This will encourage foraging, and even when a morning meal was provided I have had ducks that refused it in their anxiety to get out on range. From March to September one good evening feed will suffice and it should not be given too early. If the range offered is not good, and if the breed is not an active foraging kind, a light breakfast can be provided during the period mentioned, but if it is too heavy there will be no tendency to forage in the day.

From September to March free range can still be allowed, of course, but a morning meal will be advisable, and animal food can be introduced into the mash to take the place of natural animal food. When the ground is frozen, too, animal food should be provided. If the ducks are on range but are not laying as, for instance, growing stock reserved for future laying or breeding purposes, two meals per diem should be given—morning and night—and foraging and exercise should be encouraged as recommended elsewhere.

To get the most out of ducks on range they should be brought up accustomed to foraging and they should be of a suitable breed. They must next be handled properly as regards feeding or they will be standing about for food and show no desire to go afield and look for natural foodstuffs.

Careful Study necessary.—To obtain the best results by way of egg-production the owner must study carefully the material he is handling. If a duck is resting she will not need as much food or of as egg-producing a nature as her sister who is in full lay. The confined ducks must also be fed differently to those out on range. Again the quality of the latter must be taken into account in deciding the amount of hand-feeding required. In like manner the seasons must be allowed for, and it is useless to expect eggs in the winter if animal food is not provided. Treat ducks therefore according to the objective in view and the condition of the individuals. The best guide is furnished by the returns. If the egg-yield is unsatisfactory ascertain the cause without delay, and the same advice refers to the ducklings being fattened should their weights be unfavourable. Feeding and results go hand in hand, and if the owner is determined to master the handling of ducks he will be in every way satisfied with the returns.

Newly-arrived ducks, too, must be fed well at first until they find their bearings out on range. They should have a breakfast and be released and they should be whistled in for their tea. Get the ducks accustomed to your whistle and train them the way you want them to go. Do not be slack in your methods or the ducks will stay away at night and their eggs will be lost, as these will be laid in the swimming water or in some out-of-the-way spot on the range.

Feeding for Eggs.—Where eggs are required they must be fed for. In the winter full use must be made of animal food and heat-producing foodstuffs, and it is here where many fail. The ducks should not be *fattened*, but they require heat-producing material as well as animal food on account of the unfavourable elements and to replace the natural animal material they are unable to obtain.

One must bear in mind for what purpose the eggs are intended. If they are to be incubated the breeding stock must not be force-fed or hatchability and rearability will be poor. If, on the other hand, they are for edible purposes, one can adopt a more stimulating mash, although grit and shell are vitally essential if the eggs are to be properly shelled and normal in every way. The duck that is reserved solely for laying can be fed on a more stimulating mash than one whose services are desired for breeding, and it is a study of such points and the allowance made for same that will be found to make for success. A few eggs and robust ducklings (not to speak of a greater percentage of fertiles and hatchable eggs) will always beat a lot of eggs if with them go poor fertility, few and weak ducklings.

Is Grain necessary?—It is generally thought that the duck must have a quantity of grain daily, but that is a fallacy. The natural food of the duck includes tadpoles, frogs, grass, wild plants, fish, slugs, young eels, snails, worms, insects, grubs and so on. True grain gives the gizzard something to do in grinding it up, but its constant use is not necessary. Ducks on range will do well on soft food and remain in excellent breeding and laying condition for long periods without any grain. For the breeding stock grain has its advantages in that it means stronger ducklings, for the very reason that it produces fewer eggs. But owners very often overlook the fact that grain is fattening if fed to excess. A little grain now and then does good, and it can be mixed in the mash, scattered broadcast over the ground, or placed in a trough of water. When thrown broadcast it provides the ducks with exercise, which is an advantage.

Where heavy egg-production is desired mash must be made the most of, for the very reason that it is stimulating and can be so planned that it does not fatten. Soft food develops the yolks in the ovary and speeds up the egg-organs. If grain is given let the meal be a light one and use it more in the winter than in the summer. I do not say that grain should not be given but suggest that it is too freely used by duck-keepers. My experience of post-mortem work tells me that grain-feeding in excess results in solid rolls of internal fat and that is not good for either laying or breeding ducks. Do not give grain to ducklings at too early an age, and for those being reared for the table it is not at all necessary. The changes can be rung on oats, wheat, maize, barley, buckwheat and dari. For winter use a mixture of oats 2 lb., wheat 2, and maize 1 can be recommended. If the maize is fed in the mash it should be kibbled. As a change the grain can be boiled and added to the mash or scattered in the trough of water.

Some Essentials.—Laying ducks need a constant supply of fresh water and grit. Shell and charcoal should be kept always before them. As the ducks procure an assortment of foodstuffs when out on range it is well once a week to add a little charcoal to the soft food. Charcoal sweetens the internal organs and is a good purifier. Grit and shell should be given in the soft food daily in small quantities, and in addition to a supply in the hopper I like to keep handy a trough of water with a good depth of grit and shell at the bottom. This trough I use also for green food, occasionally placing in the water some finely minced raw greenery. The ducks are happy when dipping in this trough of water, which cleans out their nostrils.

Soft food should be fed in troughs and I prefer those patterns used for pig-feeding, although many duck-keepers place the mash on boards or sacks. Cleanliness in feeding is essential, and any food not eaten should be cleared away promptly. The drinking vessel should be constantly replenished and placed in the shade, as sun-heated water is harmful. Drinking and feeding vessels should be regularly scalded out and the latter scraped and scrubbed, and in frosty weather the grit and shell in the hopper should be stirred with a stick, whilst the drinking vessels should be emptied every night to prevent the water from freezing. Mash should never be thrown on the ground and it is well to select a different spot for feeding at each meal-time. Shade and shelter are essentials for ducks of all ages, and for ducks on range a heap of gravel and sand can be placed on the ground in a handy spot. Such will not be wasted.

The coarser meals should be well scalded with boiling water to bulk and soften them, and soft food should be given warm and not hot, although in the warm weather it can be given cold even though it is prepared beforehand with hot water. The duck does not call for much cooked food, preferring raw succulent greenery, although as a change cooked vegetables or greenery can be given. All kinds of scraps can be brought into use, as can the many kinds of animal foods. Fish and onions should not be fed liberally if eggs are for eating, and one must keep a careful watch on the eggs at a time when acorns are on the ground. Acorns gathered off the grass discolour the yolks, making the latter greenish, and when boiled the eggs appear very much like addled ones. If sold to customers the latter will think that they contain dead germs or ducklings and so one must be careful of excess feeding on acorns. The latter should be collected if feasible, or as many as possible, and charcoal should be used freely about that time. The trees can otherwise be wired off in some way if not numerous. When the acorns are gathered and properly dried before feeding one does not notice the discolouring of the yolks.

Select regular hours for feeding, particularly with ducks out on range. These will prove very reliable "clocks," coming home to tea at the appointed time. When released they will make for their happy hunting ground in marching order, not looking round for any hand-fed mash and they will come home full of expectancy, and their tea should be ready. That is one way of making them come home; otherwise irregular feeding may entice them to wander and stay away at night, when the eggs will be lost.

First-week Meals.—Whilst some rearers do not give any food until the ducklings are twenty-four hours old others wait until they are thirty-six hours old. Here are a few first-week mixtures and a little finely-cut greenery can be added :—(1) Minced hard-boiled egg and breadcrumbs, chopped green food and 5 per cent. sand; (2) maize-meal 1 lb., middlings 1 lb., bran 1 lb., 5 per cent. sand and chopped green food; (3) palm-kernel meal (well scalded), minced egg, chopped green food and 5 per cent. sand; (4) palm-kernel meal, greenery, sand and biscuit dust; (5) Sussex ground oats 2 lb., bran 1 lb., greenery and sand; (6) biscuit-meal 1 lb., Sussex ground oats 1 lb., middlings 1 lb., greenery and sand; (7)

boiled rice 1 lb., palm-kernel meal 1 lb., bran 1 lb., greenery and sand; (8) boiled mashed potatoes 1 lb., palm-kernel meal 1 lb., greenery and sand; (9) egg, breadcrumbs, milk, biscuit dust to dry off with; (10) biscuit-meal 1 lb., milk, oatmeal to dry off with; (11) Sussex ground oats 1½ lb., middlings 1½, barley-meal 1; (12) bran, 2 lb., maize-meal 1, skim milk. Many commence the use of cut green food from the second week, others from the start. If the latter is adopted the greenery must be cut very fine. A little sand should be given in all soft mashes from the start.

Follow-up Meals.—Here are a few follow-up mixtures to which should be added animal food, grit and minced green food:—(1) Maize-meal 1 lb., middlings 1, bran 1; (2) barley-meal 1 lb., bran 1 lb., clover-meal (well scalded); (3) boiled potatoes 1 lb., clover-meal 1, palm-kernel meal 1; (4) Sussex ground oats 1 lb., maize-meal 1, bran 1, middlings 1; (5) brewers' grains 1 lb., boiled potatoes 1, clover-meal 1; (5) castor-bean meal (well scalded) 1 lb., boiled potatoes 1, clover-meal 1; (7) boiled rice 1, maize-meal 1, bran 1, clover-meal 1; (8) Sussex ground oats 1 lb., middlings 1, clover-meal 1, biscuit-meal 1; (9) Sussex ground oats 1 lb., middlings 1 lb., bran 1 lb., pea-meal ¼, biscuit dust.

On-range Rations.—When the growing "stock" ducklings are on range they do not require a stimulating mash, and if swimming water and excellent range are provided no hand-fed animal food will be necessary. If animal food is provided it can vary up to one-tenth of the mash by weight according to the amount of natural animal food available, and it can be as low as 2½ per cent. The mash should contain plenty of minced-up raw greenstuff and roots (these being occasionally boiled) so that the mash is nice and bulky. Grit or sand should also be provided in the mash, say 5 per cent. by measure, and raw green food can represent quite 30 per cent. by measure when finely cut, sliced or minced. Bone-meal should also be used in all growing rations until maturity is reached. Here are a few suitable rations in conjunction with green food, grit or sand and bone-meal:—

(1) Bran 1 lb., maize-meal ½, middlings ½; (2) bran 2 lb., kibbled maize ½, palm-kernel meal 1; (3) palm-kernel meal 1 lb., clover meal ½, Sussex ground oats 1; (4) brewers' grains 1 lb., clover-meal 1, palm-kernel meal 1.

American Rations for Breeders.—Below will be found a few rations in common use on the best American duck-plants for the breeding stock:—

(1) Maize-meal 1 part, bran 1 to 2 parts, cooked vegetables 25 per cent. and meat-meal or beef scrap 10 per cent. This is fed thrice daily in addition to a good allowance of green food such as chopped cabbage, green clover, or green rye.

(2) In July the ducklings selected for breeding purposes from the early broods are given range and two light meals of mash twice daily. In late autumn they are placed in their breeding quarters in flocks of from twenty-five to thirty. Their laying mash consists by measure of two-thirds of middlings and one-third of maize-meal with 15 per cent. finely cut clover (or other finely cut green food) and 15 per cent. animal food (meat-meal or the like). Charcoal is added twice a week and grit is fed only in the soft food. Cut green clover, rye or maize is usually given with clover-hay or clover-meal as a substitute when the green form is not available. Three meals are given daily, a full one morning and night with a light lunch at noon.

(3) The breeders are selected from the early hatches when six or seven weeks of age and before the fattening process commences. The selected specimens are not confined to small pens and fed on rich food but are turned at once into a large pasture where water and shade are abundant. Here they are fed morning and night on a mash consisting by measure of bran 7 parts, broken or kibbled maize 3, and cut greenstuff 5. Grit is provided, and as the ducklings have access to a stream no animal food is given. The young ducks are fed liberally on this bulky mash. Exercise *ad lib.* is aimed at to develop muscle and stamina and early laying is discouraged. From mid-November, when the pens are mated up, the ducks are

fed for eggs, the change being spread over five days. The egg-menu then consists of (by measure) kibbled maize 5 parts, bran 5, middlings 2, meat-meal 1½, boiled vegetables 3, cut greenstuff 3, and 5 per cent. sand. This is given morning and evening in a dry crumbly state, and a box of sand and oyster shell is kept always handy in each pen. When laying commences one measure of kibbled maize (which is given to aid digestion and keep the gizzard active) is added and one part of bran cut down. Cold water is used to prepare the mashes except in the winter when hot water is employed.

(4) By measure brewers' grains 2 pts., kibbled maize 2, whole maize 4, middlings 2, bran 2, meat-meal 2, sharp sand ⅓, coarsely ground oyster shell, ⅓, closed handful of salt and a basket of cut clover.

(5) By measure kibbled maize 2 pts., low-grade flour 1, bran 2, cut lucerne 2, meat-meal ½, salt 2 handfuls, with grit and a sprinkling of granulated charcoal.

Laying Rations.—To bring the ducks on to lay the mash must be more stimulating than when they are on range and out of profit. The animal food can represent up to 15 per cent. by weight and in addition to sand or grit a little ground oyster shell should be added to all mashes. Cut greenstuff and boiled vegetables should be used freely to provide a bulky and open mash, and in the winter heat-producing foods should be introduced in the form of maize-meal, barley-meal, bean-meal, pea-meal, or potatoes, all of course used within reason. The amount of animal food must be judged by what the ducks can find, which of course will depend upon the season and whether the ducks are confined or at liberty. Two meals per diem of mash will do for ducks in confinement, whereas if on range one will suffice. If grain is given it can be a light extra noon-feed for ducks in confinement and can be replaced sometimes by cut raw greenery fed in a trough. Mash should never be given hot, but just warm, and in the summer it can be given cold. Below will be found suitable egg-rations in conjunction with animal food, greenstuff, and grit or shell:—

(1) Bran 1 lb., maize-meal 1, middlings 1; (2) brewers' grain 1 lb., bran 1; (3) palm-kernel meal 1 lb., clover-meal 1, maize-meal 1; (4) Sussex ground oats 1 lb., maize-meal ½, palm-kernel meal 1; (5) biscuit-meal 1 lb., bran 1; (6) bran 1 lb., kibbled grain 1, palm-kernel meal 1, (7) kibbled maize 1 lb., middlings 1, palm kernel 1; (8) brewers' grains 1 lb., middlings 2, clover-meal 1; (9) boiled rice 1 lb., middlings 1; (10) maize-meal 2 lb., bran ½, middlings 1; (11) bran 1 lb., middlings 2, malt culms ½, palm-kernel meal; (12) middlings 2 lb., bran 1, kibbled maize 1, clover-meal 1; (13) maize-meal 2 lb., clover-meal 1, malt culms ½, bran 1; (14) palm-kernel meal 1 lb., boiled potatoes 2, malt culms ½, castor-bean meal 1.

CHAPTER IX

A CLEAN BILL OF HEALTH

Cramp—Feather-pulling—Liver Trouble—Overcrowding and Overheating — Soft-shelled Eggs — Sunstroke — Bad Digestion — Management Counts—Treatment of Invalids.

WHEN writing a text-book I usually arrange to have three detailed chapters to cover respectively housing, feeding, and diseases. The first two ward off the latter if they are attended to on common-sense lines, and it is to help the novice that I take such care over these three branches. This is the first of my very many volumes wherein I have departed from my definite rule, and for the exception I plead a paucity of diseases whereon to give advice. The duck is extremely free from ailments, which is another very strong point in its favour compared with other members of our smaller livestock.

Cramp.—The legs are the weakest part of the duck, and cramp or leg-weakness may be the result of mismanagement in many forms. Improper feeding or housing will readily bring on cramp. Dry housing will help to keep leg-weakness away from the stock, and no matter how wet they may get when out on range they will, if thoroughly healthy, come to no harm if they come home to a nice dry bedding. Cold or sparsely-littered floors are often the fore-runners of cramp, which may be due equally to bad digestion.

Young ducklings may have cramp through getting wet by reason of their running in wet grass, swimming at too early an age and for too long a stretch, or being caught in a rain-storm. When placed near the fire or in a slow oven in a hat and well wrapped in flannel they will often recover. There should always be shelter handy so that the ducklings can be driven in directly a storm threatens.

Feather-pulling.—Ducklings sometimes catch the habit of feather-pulling, but this is due to an insufficiency of greenery and animal food and may be aided by overcrowding. Remove the cause directly the habit is noticed by adopting a proper ration.

Liver Trouble.—Bad digestion often sets up liver trouble, which is usually followed by leg-weakness. The green or yellow (more advanced) droppings will act as a clue. Ducks that by injudicious feeding and handling are allowed to get overfat often suffer from liver trouble and its consequent leg-weakness. Proper handling is important as the duck that is not in lay does not want so much food or of the same nature as the one that is in full profit. Again, one can in giving plenty of food, always make the mash bulky and non-fattening by the liberal use of greenery.

Overcrowding and Overheating.—Overcrowding and overheating must be avoided with ducklings as they set up sweating and subsequently chills as a result of exposure directly afterwards. Diarrhœa, staggers, and watery eyes may all be a result of too high a temperature, and the remedy is in the hands of the rearer, who must avoid the causes. A thorough mastery of temperatures in accordance with the season and the outer elements is essential to success in artificial rearing. On some days no heat will be necessary in the daytime when the rearer will board off the heated hover from the ducklings, whereas at night a little warmth will be desirable. Such points must be carefully watched.

Soft-shelled Eggs.—Soft-shelled eggs are due to many causes, chief among them being a derangement of the oviduct caused by excessive internal fat, lack of shell-making material, and the use of too stimulating a diet. Put the invalid on to the Glauber's treatment, and give the iron tonic. Include shell and grit in the mash and reduce the animal food if this is suspected as the cause. In giving animal food it should be introduced carefully, the amount being increased gradually until the maximum quantity is reached. It should be reduced in the same way. Undue excitement may cause the dropping of a few soft-shelled eggs, and I have often traced the trouble to the excitement of the duck brought about by undermating and consequently too much attention from the drake. The ovary is deranged as a result and the over-stimulation causes abnormal eggs to be laid. I have particularly noticed this trouble at a time when, after mating, only one or two ducks are in lay, thereby getting more than their due share of attention from the male.

Abnormal eggs are invariably due to some derangement of the laying organs and in most cases can be traced to excessive layers of internal fat. The latter presses in the oviduct walls and blocks or twists this channel down which the eggs pass from the ovary. The eggs are in consequence misshapen or freaks.

Sunstroke.—Shade is essential for young ducklings owing to their thin skulls, which are easily affected by the hot rays of the sun. The invalids will stagger and appear helpless. The application of cold water to the head will often cure a sufferer, but guard against this serious trouble by providing ample shade. Always keep the drinking water in the shade and let there be a constant supply, as excessive drinking of cold water after a fast will on a hot day cause prostration.

Bad Digestion.—In nine cases out of ten adult ducks die from digestive disorders. Such may not always be the direct cause of death, but the bad digestion sets up some other complaint which ends fatally. An over-fat duck is always liable to lose condition suddenly and die from heart trouble or the breaking of a blood-vessel in the brain. Liver trouble, too, may ensue and with it leg-weakness. Once the digestive organs get out of trim it is difficult to say what ailment will follow. A cold or wet day comes along and the exposure causes death, although had the internal organs been sound the duck would have weathered the storm.

The main thing is to adopt common-sense methods of feeding whereby the ducks will not get too fat. Grit, sand and shell will aid digestion, as will granulated charcoal. The latter should be kept always before the ducks and once a week it can be given in the mash. Green food is quite as essential as grit.

Sour or tainted food picked up on range, or stagnant water, will upset the digestive organs and affect the liver despite the fact that the ill-effects may not be noticed for a long time. When bad weather sets in the invalid dies. Charcoal will sweeten the internal organs and rectify matters and I recommend its constant use for stock of all ages, the size of the charcoal depending on the age of the ducks. Powdered charcoal can be used for very small ducklings.

Observe utter cleanliness in feeding, well scalding out all utensils and adding a little Izal disinfectant fluid to the water used for the purpose. Remove promptly any food left after a meal and clear away filth or the ducks may eat this and sicken. Wire off any stagnant pools and give Glauber's salt periodically to clear any unsuitable foodstuff from the body and give charcoal to prevent the food from putrefying within the gizzard.

Management Counts.—Whilst the duck is particularly free from diseases the owner can ward off even those few ailments that are met with if he adopts common-sense methods of housing and feeding. Other essentials are the hatchable egg and the rearable duckling, as will be gleaned from the chapter on breeding. Watch all the stock carefully, as it is half the battle to treat the ailing ducks directly the symptoms are noticed. Watch the egg-records and look into the cause of any serious drop, and on no account run out of animal food. Carry good stocks of foodstuffs to avoid too sudden a change through the compulsory omission of important ingredients. The duck that is out of sorts will usually be noticed dropping out of file to the rear of the flock as they are on the run. It will look at the owner as if asking for pity and no observant owner can miss this symptom.

Keep a careful watch for the blocking of the nostrils of ducks and ducklings with dirt or food. Provide the ducklings with deep enough water for them to dip their bills in, and give the adults minced raw greenery in a trough of water with grit and shell at the bottom to encourage them to wash their bills.

Mince up raw greenery for ducklings very fine and chop up small that given to the adults. Crop-binding is sometimes met with, but not often, and it can be avoided by this precaution. Egg-binding is sometimes noticed but is not common. A plentiful supply of shell will help matters, as will the keeping of the young ducks in a racy laying condition.

Treatment of Invalids.—Isolation of invalids is recommended directly any are noticed to be ailing. They should be placed in a well-ventilated box or basket provided with ample bedding. Two stock medicines every duck-keeper should have handy are mixtures made from sulphate of iron and Glauber's salt. Dissolve 2 oz. of sulphate of iron in a gallon of boiling water and as a dose give a dessertspoonful of the mixture to each pint of drinking water, using a glass, earthenware or china drinking receptacle. This represents an excellent strengthening tonic and can be given twice weekly when the ducks are ailing and once a week to the flock at times when there is a strain on the system. This tonic is useful during the moult, when the most growth is made, just before laying commences, and half-way through and directly after a heavy laying or breeding season.

The other stock medicine is prepared by dissolving 8 oz. of Glauber's salt in a quart of boiling water, using as the dose a dessertspoonful to each pint of drinking water. In cases of ailments it can be given twice the first week, twice the second and once the third, the medicine then being stopped for a time. Periodically it can be given once a week for periods of not longer than three or four weeks with a rest between. This medicine will flush the liver and put right digestive disorders. It can be given in conjunction with the sulphate of iron, preferably alternately. Glauber's is useful during the moult and the dose can at any time be added in the same proportion to the water used in the preparation of the mash.

CHAPTER X

BREEDS AS YOU SHOULD KNOW THEM

Making a Start—Breeds of Ducks—Crosses—Ornamental Varieties—Selecting a Breed—Type in Indian Runners

EVEN though you may be careful as regards management, success will naturally depend on your starting with the proper material.

Making a Start.—As with poultry-keeping there are many ways of making a start in duck-keeping. These include the purchase of (1) eggs for hatching; (2) day-old ducklings, (3) mated breeding stock and (4) adult specimens. Season will often decide which method to adopt for the best results, as will the aims of the would-be duck-keeper. There is an advantage in buying sittings or ducklings in that the youngsters can be reared as the owner desires them to go. If range is available they can, for instance, be brought to maturity amid what will be their environment after they have commenced to lay. Such a plan will ensure, under proper management, early laying.

Against this plan there is this to be said, that the would-be duck-keeper will be inexperienced in rearing, although, however, there is the saving clause (which is absent in chicken-rearing) that ducklings are not difficult to bring up. One can, of course, buy a properly mated breeding pen and incubate the eggs laid, rearing the ducklings therefrom to maturity. If this method is adopted one should buy the stock in good time before the eggs are needed for hatching purposes, so that they can get nicely settled down to their new environment.

When buying stock for laying purposes it is preferable to buy these in the autumn; so that they have a little time in which to settle down ere eggs are expected. They can then be fed into laying condition. The later in the season the young ducks are purchased the more they will cost, and the fewer eggs they will lay in the season for their new owner. Supposing one buys young ducks in, say, August or September, the vendor will be carrying a large head of February and March specimens, and as he has reared them especially for sale those who order in time are sure of getting the early-hatched ducks. The late-comers will obtain April and May hatched stock, which will be later in commencing to lay. If, on the other hand, one delays till, say, February, the vendor will have sold his surplus young ducks except those reserved for his own use for breeding purposes; and if persuaded to part with these his quotation will be very high, for the very reason that they are of best quality and because by retaining them in his breeding pens he can rely upon high prices for all eggs laid for sitting purposes, and will still have the stock in hand.

If one buys adults in, say, May, the price may be the same as in the previous autumn but, as will be seen, the vendor has had the benefit of plenty of eggs laid before May which are lost to the purchaser. Many duck-keepers do not trouble themselves about these smaller but very important details, but these very notes are worth to each reader more than he or she has paid for the volume. A reliable breeder should be selected so that the hatching stated can be relied upon, and that is one other advantage the beginner has in starting with eggs or ducklings, for he does know the age of the ducklings. Again, where one rears the ducklings, any that ail can be marked and those that forge ahead can be noted. As the ducks reach maturity, too, the owner will know which commence to lay to time, and such data will help him materially in his future breeding operations.

It is advisable where one is interested in breeding for heavy egg-production to buy the ducks, if over one-season specimens are selected, in good time so that their laying merits can be tested. A small start should be made so that the progeny can be fully tested-out and the best bred from. Antecedents count very heavily in breeding. Pay a good price for the eggs, ducklings or stock ducks, and make up the extra cost by hatching high-class progeny. It always pays! Do not expect every duck purchased to exceed the 200-egg mark in the season, but pick out the best layers and improve your flock averages gradually and surely by selective breeding.

Aylesburys.—This is the English breeder's *ideal* table duck, and its chief points are immense size, hardiness and early maturity. The ducklings can be picked out by their pink flesh-coloured bills. The eggs vary in colour, some being green and others cream, although as a rule they are pearly-white. This variety is bred in only one colour, viz. white, and drakes scale 10 lb. and ducks 9 lb., whilst the legs are a bright orange in colour.

Campbells.—To my friend Mrs. Campbell of Uley does the credit belong for the origin of the Campbell ducks, which are bred in two varieties, the Khaki-Campbell being the more recently introduced colour. The drake is khaki-coloured except for his bronze-green head and stern, whilst the duck is khaki-hued throughout with each feather showing a delicate lacing of darker buff. The Khaki-Campbells boast of Runner blood, and are splendid foragers, at the same time commencing to lay at an early age. Some splendid egg-records have been set up by this colour, and weights of 4 to 4½ lb. have been secured with ducklings at twelve weeks. The original Campbell had as its origin a Runner duck which laid 182 eggs in 196 days, and the wild duck was brought in to improve the flavour, hardiness and foraging capabilities. The original Campbell males had dark green heads and bills, grey backs, yellow legs, pale claret breasts, black sterns and a slight ring round the neck. The ducks had greyish-brown feathers pencilled with dark brown, brown heads, yellow legs and dark bills.

Cayugas.—The Cayuga came to us from America, and is lustrous greeny-black in plumage and very much after the Aylesbury in type. It is hardy, matures early and is a good layer, whilst the skin is white and the flesh sweet. It is a very handsome variety, and lays a dark-green egg. Drakes scale 8 lb. and ducks 7 lb.

Coaley Fawns.—Miss N. Edwards of Coaley, Glos., originated this breed, which is a splendid forager and layer. It is an even shade of fawn with chocolate-coloured heads in the drakes, orange bills and legs. It is a stylish, upstanding type of duck.

Crested.—Much resembling in shape the Aylesbury but not quite so large and without its heavy keel, this variety carries a crest or top-knot which is large and globular. It has existed in Scotland for over eighty years, and is a good layer and a creditable table representative. Any colour is permissible. Both sexes should weigh 7 lb. or more.

Indian Runners.—There have always been warm controversies on the Indian Runner duck as regards first its origin and secondly the judging of prize-bred specimens at the shows. Now "type" is receiving attention. The fancier declares that the Runner was first brought from India by a sea captain who, when ashore, had been attracted by their peculiar carriage, active habits, egg-producing powers and foraging merits. Some eighty years ago he brought a few specimens home with him, and presented them to farmer-friends in Cumberland. They immediately got a good name locally for their egg-laying merits, and the progeny spread over the Scottish border and into Westmorland. Not till 1890 were the Runners taken up strongly by the fancier, who then realized that the specimens were in many cases losing their original penguin-like appearance, due to the crossing of pure Runner drakes with ordinary farmyard varieties.

Kendal show in 1896 saw a large class ot twenty-one pairs in competition, due chiefly to the efforts of Miss Wilson-Wilson of that town. From then the breed became very popular, and classes followed at the various classic events. The Waterfowl Club took up the breed, and then the first quarrel commenced. The standard aimed at *marking* in preference to type. The Indian Runner Duck Club later made its appearance, with the object of reviving the true type and preserving the purity and character of the breed. A standard was drawn up, and the Club has insisted upon a due recognition of same by judges. Breeders had as their ideal in what we will term "standard-bred" specimens the elevated bottle-like body, balanced in such a manner as to give perfect freedom of movement, and the legs pitched far back, allowing the quick-running gait which means foraging capacity. They insisted on the Runner being symmetrically formed and properly balanced with the legs pitched back so that the duck was compelled to elevate the body to such an extent as to bring neck and body into an almost direct line, the profile being suggestive of the outline of an old-fashioned soda-water bottle set at an angle of 60 to 70 degrees.

The Indian Runner Duck Club caters for the "standard-bred" specimen, a comparatively small tightly-feathered duck with very erect carriage, active habits, fine head, wedge-shaped bill, full and quick bright eye, thin and slender neck and lengthy rounded body, with legs set far back. It travels with a straight-out run, and does not waddle or roll like ordinary ducks. It has been likened to a soda-water bottle when in motion set at an angle of 50 to 60 degrees, a character seen in a front or semi-front view to best advantage. When startled an almost perpendicular pose or attitude is assumed.

In judging type and action come first and judges are desired to see the specimens out on the run before making their final awards. The ideal is the duck with all parts in graceful harmony and showing the most perfect symmetry, proportion and carriage. Standard points are (1) head, eyes, bill and neck exclusive of lower neck expansion, 20 points; (2) shape and general appearance of body, including lower part of neck, legs and feet, 35; (3) carriage, 30; and (4) colour and condition, 15; total, 100. As will be seen colour is relegated to bottom position.

The *head* is fine and somewhat flattened over the skull, with *eye* full, bright, clear, alert and high up in the skull. The *bill* is strong and deep at the base, where it joins and fits almost insensibly into the skull, and thence comes as nearly as possible straight down to the tip, giving it a wedge-shaped appearance. The *neck* is very fine, thin and slender to where it begins to form the expansion towards the base of the neck. This expansion fits almost insensibly into the upper part of the body, so as to appear almost part of it. *Head* and neck are carried high and slightly forward and must not be curved or swan-like.

The *body* (which includes the lower portion of the neck expansion) is long and narrow, of nearly uniform thickness, very tightly feathered, with wings closely packed and in all approximately twice the length of the neck to the top of head. When standing erect stern appears comparatively short and curves round to the tail, which is close and neat and carried nearly in a line with the body, but in some excellent specimens it is slightly elevated or turned upwards, and a fullness of the lower stern is frequent in the most prolific layers. When on the alert the duck carries neck and body almost in a line at an angle of from 50 to 70 degrees to the horizon.

The *legs* are placed much farther back than in other breeds. The shanks are comparatively short with small supple feet and strong thighs to enable the duck to balance properly and maintain an upright position when on the run.

The oldest and best established varieties are whole-coloured fawns, pure whites, and fawn-and-whites, but any colour or combination is permissible. From the earliest times it has been a distinctive character of the Runner's plumage that the coloured body feathers be laced in ducks and pencilled in the drakes. The feathers of the duck have dark brownish centres with margins or fringe of a somewhat lighter shade which overlap and give the surface an even shade. The body feathers of the drake are minutely pencilled or peppered with darker lines terminating in a fringe or margin of more pronounced tint which imparts an even shade of surface colour. At the front of the breast towards the throat the colour often deepens a little in drakes. Head, rump and upper part of the tail are of a dark bronze colour, often showing a faint greenish lustre. In both sexes the body colour lightens as season advances and continues to fade until the moult sets in. In fawn-and-whites even clean-cut markings are preferred. The bills of both sexes vary in colour from a greenish yellow to green and almost black-green, according to the season, and the legs and feet are deep yellow to dark tan. The whites have bright orange legs and feet and orange-yellow bills.

As layers substance and construction are held necessary, small squatty specimens being useless and heavy, bulky birds are less active as foragers. A medium size with good reach and perfect symmetry is considered advisable, but appearance and activity are a truer guide than actual weights and measurements. The *weights* are taken as drakes 3½ to 5 lb. and ducks 3 to 4½ lb., with *measurements* 26 to 32 inches for drakes and 24 to 28 inches for ducks. *Disqualifications* include: thick necks; legs centre of body and too level carriage; less than an angle of 40 degrees; waddling or rolling gait; and above maximum weights. Whilst the Runner Duck Club places shape and carriage foremost, there is the International Runner Duck Club which couples shape and carriage with *markings.*

Now we have a body of utility breeders with eyes on the egg-laying merits of the Runner, who have a different ideal to the "standard-bred" specimen. They (members of the Utility Duck Club) contend that the latter is too long and slim, which tends to delicacy, while lack of shoulders contracts the crop and restricts the amount of food which can be stored for digestion during the long winter nights. A perpendicular bird, they contend, cannot have a fullness under the tail allowing room between the pelvic bones for the laying of a large egg, the main essential of laying type. A slightly cobbier shape and a little stouter neck are two other points aimed at as indicative of breeding capacity. The drake is asked to fertilize many hundreds of eggs, and stamina must be assured, they aver, by type as well as other factors.

In a recent letter to me Mr. E. A. Taylor, of Rotherwas, Hereford, who specializes in heavy-laying utility White Runners, says :—

"It is my opinion that both the show and utility men will have to give way over this question of type and meet half way. The great mistake was to ignore utility and set up an ideal based upon ignorance. Who knows *yet* the ideal utility type ? My idea is to select the nearest to the present upright evenly-balanced alert type, neither too reachy nor too squat, from the heaviest layers, and to breed from those and to fix that style. The specimen you have a photograph of (see coloured wrapper—Author) shows a really good combined type together with stamina."

In glancing through my files I notice three letters of interest on the subject, and publish below extracts therefrom. As the letters are more or less private communications from friends I withhold their names out of courtesy to them.

(1) For my part I do not care for the typical standard-bred Runner for egg-production. I have kept both types, but I find my own strain of layers can beat the standard bird hollow in the way of egg-production. My birds have not the real long neck and head of the standard specimen and are not so cut away underneath. I like a sprightly Runner, but just the medium, somewhat cobby type with good bright eye.

(2) I have found from experience that the original type of Runner is the best layer, and my best egg-producers are those with good carriage, fine heads and necks, good sharp eyes, with their legs well set apart and with very alert appearance. The best layers are easily detected by experienced hands, coarse birds of all descriptions being avoided.

(3) The soda-water bottle wants deepening a bit at the base of the neck, and I prefer a bird not so upright. If you take a midway point between the Buff Orpington Duck and the standard-bred White Runner you get my ideal. I think, contrary to most people, I believe, that a rather heavy type of Runner makes the best layer, in reason of course, and not losing Runner characteristics.

It will be noticed then that the Waterfowl Club, Utility Duck Club, Indian Runner Duck Club and International Indian Runner Duck Club are striving for different ideals, although the two latter are agreed as to type. The Indian Runner Duck Club has done much noble work on behalf of the breed under the very able leadership of Mr. J. W. Walton, the Hon. Sec., of Tow Law, Co. Durham. Club Standards and type models are issued, and all interested in the Runner should procure these, particulars and prices of which can be had on application to Mr. Walton.

It is always a delicate matter to comment upon controversies, because having so many personal friends on both sides one is sure to displease some and please others. My great desire is to see the cult of the duck spread to such an extent that every country-dweller with a grass range and suitable environment keeps a flock of laying ducks. The laying duck has been in the background in the past merely because the public has been unaware of its wonderful merits and accommodating ways. Let us all strive therefore to help the laying duck along, which should be the main objective of every breeder. Controversies help to boom a breed, 'tis true;

but once the public are disappointed, there is general disgust, and the breed selected goes overboard very quickly for another variety. A flock of Runners on the run amid suitable environment makes as pretty a picture as one can wish for, and with one eye on duck-keeping in general and the other on the Runner in particular I plead earnestly for a round-table conference.

Let us remember that there is another breed of egg-laying ducks waiting on the doorstep for all disappointed novices, viz. the Orpington, and there is, too, the Khaki-Campbell close handy. This being so, would it not be well for all who breed Runners to have a round-table conference and see if a united front can be arranged? If our Board of Agriculture had been made of the proper metal we should have had this matter settled long ago. It is not too late, however, for them to take the lead. We need for our guidance official laying competitions with the various types of Runners (and other breeds for all that) competing. There must for the Runner and other " land " breeds be suitable environment so that they can do their best under natural conditions. Pen-averages can be taken in one test, whilst trap-nesting can be carried out with another, and so on. It is such valuable data that we want and I suggest to the Board that they call together a conference of duck-breeders and ask them to plan rules to govern fair tests. A Government subsidy should then be forthcoming, and the whole scheme would be a credit to the Board and of vital national importance. Let there be organized effort, but let the lead come from the Board of Agriculture, otherwise why not scrap this at present useless Department as far as the smaller livestock go?

The Runner is undoubtedly our finest laying duck, and being a " land " breed its main business is to forage and find most of its food in the natural season. All must realize this because economy in feeding and profits on yield go hand in hand. We must on no account lose the true foraging characteristics of the breed, and our ideal laying Runner must be sprightly and active in every detail. After all the Runner is the " Leghorn " of the laying-duck world and a veritable egg-machine when properly handled. Let us retain that activity and all characteristics that give us more and still more eggs and economy in feeding. Let the Runner be kept pure if the owner is to retain for his specimens the name of **Indian Runner.** In many strains I have noticed Pekin blood, and in others Aylesbury, but such specimens should not on any account be sold to the public as true Runners. The Runner is first of all an "egg" breed, and those who are aiming at commercial new-laid eggs should keep it pure. It cannot be styled a "table" duck when compared with other heavier breeds, and it is to gain the dual merits that crossing takes place. With a united front all strains could be registered, and that would do the needful in spreading broadcast specimens of the true type and breeding. The keel is fuller, I have noticed, with the duck when in full lay than when it is resting.

The Runner lays a white-shelled egg, although in a few strains the green egg is noticed, but this character is not true. The white egg should be bred for. As regards colour of plumage, any combination is permissible, as I have stated.

Muscovy.—Known also as the Peruvian or Musk duck this variety has lost its utility. It is quarrelsome, and is found chiefly in our parks. It is bred in several colours, viz. black and white (piebald), white, black, and blue-dun. The eggsare white, but the breed is a poor layer, and the skin has a distinct odour of musk. The legs are a pale yellow. The eggs, peculiarly enough, take thirty-four to thirty-five days to incubate, and owing to its large size the Muscovy is often used abroad to hatch eggs of turkeys and geese.

Orpingtons.—Possessing all-round qualities, this breed is bred in two colours, viz. buff and blue respectively. It is a splendid layer, and was made some twenty odd years ago as follows: Runners were mated to Aylesburys, Runners to Rouens and Runners to Cayugas, and the progeny were crossed with one another until the buff plumage was secured. Blues followed by the use of those ducks which sported some blue plumage, the darkest being mated with Cayugas and Pekins.

The Orpington is a splendid forager and is a commercial egg-duck with the additional asset of being more of a table variety than the Runner, drakes scaling 7 lb. to 9 lb. and ducks 6 lb. to 8 lb. The buffs are a nice even shade of fawn-buff throughout with the head and upper portion of the drake's neck at least two shades darker; the legs and feet are a bright orange-yellow, and the bill yellow with dark bean at tip. The blues are an even blue without lacing, with a medium white bib under the throat; the bill is blue and the legs and feet orange and black. The eggs are green or greenish-white in colour.

Pekins.—A rapid grower the Pekin is to the American table or "green" duckling raiser what the Aylesbury is to the English table-duckling specialist. Unlike the Aylesbury it possesses no keel, but is somewhat boat-shaped. It is a good forager and lays a white egg, and is more prolific than the Aylesbury or Rouen. When crossed with the Aylesbury females of the Pekin are usually employed. The bill and legs are a bright orange in colour, and the plumage buff-canary or deep cream. The carriage is almost erect, and standard weights are 9 lb. for drakes and 8 lb. for ducks.

Rouens.—Handsome in plumage and a layer of pale-green eggs the Rouen is noted for its size and table qualities, being often crossed for table purposes with the Aylesbury. The breed does not mature so quickly as the Aylesbury or Pekin and the colour of plumage is against it for table purposes. Drakes weigh 10 lb. and ducks 9 lb.

Wild Ducks.—The wild duck or mallard is very similar to the Rouen as regards plumage, and is the ancestor of most of our domestic breeds. It is often bred extensively on farms where there is ample swimming water either to stock parks or for edible purposes, the flesh being very tasty. If the ducklings are hatched out under the hen and reared by the owner they become more or less docile. Home-tamed wild ducks are kept far more extensively than many imagine, and they are small eaters as well as good layers.

Crosses.—The Pekin is considered a better layer than the Aylesbury, and is often crossed with the Aylesbury to produce all-round progeny and to get early eggs. The Runner is also used with the Aylesbury for the latter object. The Rouen is also crossed with the Aylesbury for table purposes. Whilst the Runner is not an ideal table breed on account of its size, the flesh is very sweet and has quite a distinct flavour. Often Runners are headed by a Pekin drake to improve the table qualities. The Runner drake when mated to ordinary ducks will improve the laying merits of the progeny. One of my best crosses for egg-production has been the mating of a Runner drake to Buff Orpington females, and the progeny to another unrelated Runner male.

Ornamental Ducks.—A few ducks add a finishing touch to the beauty of any country residence where a swimming pond, no matter how small, is available. Whilst any of the utility varieties can be kept for a combination of usefulness and ornament, the owner can select any of the smaller breeds he desires for ornamental purposes. The list of fancy ducks is a long one and they are of all colours of the rainbow. I might mention Call ducks (grey, like Rouens, or white, with yellow bills), Carolinas, Mandarins, Shieldrakes or Sheldrakes, Pintails—with long pointed tails—Whistling ducks, Teals, Black East Indians—a kind of Bantam Cayuga—and Northumberland Divers.

There should be nice cover on the bank of the pond allotted to ornamental varieties, and as these miniatures are usually timid they should not be unduly disturbed but allowed to manage their own affairs. To prevent flying away the ducks should be pinioned when introduced to the pond and the young should be similarly treated before they are able to fly. The ducks can be allowed to hatch their eggs, or these can be placed under Silkies or small hens.

Selecting a Breed.—In selecting a breed of ducks due regard must be paid to the object in view and environment. If eggs only are wanted the Runner heads the list, followed by the Buff Orpington, Khaki-Campbell and the Coaley-Fawn. If a combination of egg-production and table merits is desired, the Buff Orpington, as the heavier breed, will take the leading position. Environment must be allowed for in this respect that on an extensive range a foraging breed like any of those mentioned above will find most of its food and hand-feeding will be reduced to a minimum. It would be waste of duck-power, for instance, to keep a flock of Aylesburys where there was ample and mixed range; the Runner should be selected, or any of the egg-ducks previously mentioned. On a small range, however, one would probably find it more profitable to try one of the heavier foraging breeds like the Buff Orpington than, say, the Rouen, Aylesbury or Pekin, because of the increased number of eggs that would be produced. Or on a small range the rearing of table ducklings could be adopted. The Runner is essentially a "land" variety and does not call for swimming water, but any of the foraging breeds like the Orpington, Khaki-Campbell and Coaley-Fawn do well and breed well without water to swim in.

When we come to the table-duckling speciality the pure Aylesbury and Pekin, its crosses (both ways are practised), and the Rouen-Aylesbury cross call for attention. These are not "egg" varieties like the foraging breeds just dealt with. Although egg-yield must depend upon strain these table varieties have not had their egg-laying merits exploited, with the result that from the Aylesbury one might get under 120 eggs per annum, and from the Pekin under 140 eggs. By selective breeding and special feeding such totals can of course be increased, because individual specimens will lay quite a respectable number of eggs in the year and their qualities can be maintained and improved in a strain. It is in the real "egg" breeds that the heavy records are and can be obtained.

Colour must also be taken into account in certain instances. For table purposes where the best markets are being supplied, white-plumaged ducklings are preferable to dark-coloured ones. Not only is more paid for the carcases, but the white feathers make the best prices on the feather market. Colour also plays its part in breeding. The novice will do better with a whole-coloured variety than one of many colours. The White Runner will, for instance, be easier to handle than the fawn-and-white where the amateur is concerned.

CHAPTER XI

POINTERS TO REMEMBER IN DUCK-KEEPING

IF you are interested in the production of new-laid ducks' eggs educate your local customers to appreciate them, and to pay more for them than for hens ' eggs. Point out strongly that they are heavier than the latter !

Direct dealing with the public means highest possible return for produce. Do everything possible to work up a clientèle.

Money-down transactions pay for the food-bills.

You *can* preserve ducks' eggs in waterglass ; it is *cold storage* that the eggs will not agree to, owing to the different composition of the shell as compared with hens' eggs.

If duck-houses are made in sections they can easily be removed to fresh quarters.

If the house is raised a little off the ground the wooden flooring will keep nice and dry.

Plan the duck-house before erecting a stake, and construct all houses and runs to save time and labour.

Do not leave food in the trough after a meal, or it may go sour and do harm if eaten.

For preference have doors, runs and windows on the south side. A south-westerly aspect is the next best thing.

During the day well air the duck-house by throwing open the doors.

Never stint " bedding " material in duck-houses.

A piece of stout plate glass on the south side of the house near the flooring and another in the roof will make the interior of a dark dismal house light and cheerful. These " bottom " and " top " lights are to be strongly recommended in large structures.

The duck likes plenty of fresh air in his sleeping quarters.

Rats, stoats and foxes are enemies of the duck, and sparrows rob the corn and meal bins.

Drakes are amicable when run together with a flock of ducks. This is a great advantage because where only a medium flock of breeders is kept they need not be placed in separate small breeding quarters, but allowed free range together. The food bill is thus reduced to a minimum because if the flock had to be divided up into small breeding quintets and each lot separately housed free range would not be possible and more hand-feeding would have to be adopted. Nor will drakes in adjacent pens fight through the netting like cocks.

Ducks like strawberries, which should be fenced in, otherwise they do little harm in the garden.

Flocks of ducks can be mixed without fighting like cocks and hens when strangers are placed with them.

If " freak " eggs are being laid suspect too stimulating a diet.

Confine ducks till 9 or 10 a.m. or they may lay their eggs out on range. Ducks often drop their eggs in the water, when they sink, coming to the surface after they have become rotten. Regularly inspect the swimming pond used by ducks, and if eggs are noticed floating on the water confine the ducks a little longer in the morning.

Poor pasture will be enriched by the droppings from ducks.

If you can secure *fertile* eggs early in the season you can make good money ; careful management of the breeders will help matters.

The laying of young ducks is usually irregular at first.

Ducks are apt to sweat during transit, which may bring about a moult, if nothing more serious. For this reason use well-ventilated receptacles. If a box is used let the bottom be slatted or have a few holes bored therein. Many breeders use ordinary wooden boxes (bedded down) with open wire-netting over the top. Some breeders make several small holes in the bottom of boxes containing day-old ducklings to let in fresh air.

When mating up your ducks do so with the object of increasing the yield of the progeny. If you do not trap-nest the stock mate together specimens from the best laying pens. Aim at high flock averages, and if you do not pen the females singly run them in pairs or trios when testing them out to find which are worthy of a place in the breeding pens.

In America on many duck plants no swimming water is provided for either adult breeders or young ducklings.

5,000 table ducklings have been reared on less than two acres in America.

Do not visit duck-houses by night with a lighted lamp.

Shade is essential for stock of all ages.

Ducks mature earlier for breeding than drakes; let the latter therefore be older than the former when mated.

Rice hulls and fish represent the Chinaman's fattening mash for table ducklings.

Give ducks in confinement fresh drinking water two or three times daily.

In a test only 25 per cent. of eggs gathered off the bottom of the bathing pond used by breeding stock proved fertile. Many wash ducks' eggs before incubating them, but this reduces their hatching power.

Ducks' eggs, if dirty, can be cleaned with Monkey Brand prior to marketing.

When giving hard-boiled eggs to ducklings give the shells as well after crushing them.

A duck is not considered fully matured till it is two and a half years old.

Some ducks show a black streak on their bills when they commence to lay.

Too-wet food causes diarrhœa and loss of flesh in table ducklings.

Ducks' manure ranks next to that of pigs for gardening.

Ducklings that are not kept warm enough will have a listless appearance, with the down standing out straight. They will mope about with humped backs and the feet and legs will go colourless and stiff.

When ducks are not hungry they will come up slowly to their food.

On one American table-duckling ranch over 500 broody hens are used each season besides incubators.

"Green" ducklings are those marketed from eight to twelve weeks of age, before the pin-feathers appear.

To tell the sexes of ducklings go behind the latter and gently drive them. The males will utter a thin weak note, whilst the females will quack.

Some breeders put twelve, thirteen and fifteen ducks' eggs under a broody hen and let the latter have up to fifteen or more ducklings. The novice will be well advised to try smaller sittings until he has fully mastered natural incubation.

Before erecting the duck-house remove the turf on the site to ensure dryness, even if the floor is raised off the ground.

Place all food-bins on tarred bricks or battens so that the meals, etc., will be kept dry.

There is no flying over 6 ft. fences with ducks. The domesticated breeds are either "waddlers" or "runners."

Even white-egg breeds of ducks often go broody.

If you combine natural and artificial incubation leave each broody one or two eggs to hatch off so that she will take readily to ducklings given her from the machines.

When at the close of the season you take the incubators to pieces be sure and mark all parts when putting them away in a drawer. The proper sections can then be fitted up the next season.

SECTION II

GEESE

Question of Environment—Feeding and Foraging—Housing—Is Swimming Water necessary?—Laying—Breeding—Hatching—Rearing—For the Table—Killing a Goose—Telling the Sexes—Varieties—Management and Habits.

DESPITE the fact that the goose practically boards itself it is not kept to the extent that it should be. I doubt if the head of breeding stock has much exceeded two hundred thousand in Great Britain, although more than two and a half times that total has been recorded for Ireland.

Question of Environment.—It is not everybody who can profitably keep geese, and yet there are thousands who can but do not. In the first place the goose is not at home in the backyard, and when I say that ten geese will eat as much grass as a cow the reader will be able to say whether his or her environment is ideal or not. Secondly it is not a bird for confinement in either a stackyard or a kitchen garden. Not being a 200-egg-per-annum layer the goose must be provided with suitable surroundings so that it can be fed economically and leave a good balance on the right side. Geese are large eaters, requiring quite twice as much food as the ordinary hen, so that with few eggs laid cheap feeding is a *sine qua non.* If the birds are penned hand-feeding will have to take the place of natural grazing and that means more expense for the same return.

The goose is the ideal bird for the farmer, the "commoner" and the smallholder with grass-land to offer, and it need not be the best quality pasture because the goose is accommodating and not particular as to the class of herbage available. In fact poor pasture that will maintain no other stock will keep the goose fit and will be considerably improved by the droppings.

Feeding and Foraging.—The goose comes the nearest to our ideal of self-supporting livestock, and that is why one should provide it with suitable environment. Woodland, grass, stream, ploughed land and common would represent the most perfect environment, although goose-keeping can be taken up with some of these conditions absent. As grass is the mainstay of the goose there should be plenty of such to provide free feeding, but the birds must be so handled that they are made to use this class of range to the fullest extent.

The goose, like the duck and the turkey, can easily be spoiled if too much hand-feeding is carried out. The natural tendency to forage will be, and usually is, ruined through careless management. The goose has rather different digestive organs to those of our other feathered friends and it is in consequence a continuous feeder. If the owner is continually feeding the stock they will mope about, and whilst the food-bills will be heavy the birds will also get too fat and hatching results will be far from satisfactory.

Heavy grain-feeding is too frequently adopted for both the goose and the duck, whereas I contend that such tends to fatten the stock, which is far from desirable. During late spring, summer and autumn, when there is ample free feeding to be had, the stock should be released in the morning and allowed to forage, no breakfast being provided. Clean drinking water in plenty should be kept in the shade near the house as the geese will probably return after a forage for a refreshing drink if there is not a stream handy. They will make a long tour in search of natural food prior to returning for the day. A tea of mash can be given to them on their return each day. Occasionally grain can be substituted so long as it is not fed regularly, and it can be scattered in a trough of water or thrown broadcast over the grass.

In the winter more hand-feeding will be necessary for the reason that natural food will not be so plentiful. A warm mash can be given morning and night and occasionally (particularly in very cold weather) a feed of grain at noon is recommended. Sometimes, too, grain can replace the mash for tea and the noon meal can sometimes consist of roots and greenery finely minced up and given in a trough or in water. In the winter months, however, a nice open mash is desirable, consisting chiefly of succulent greenery and roots. These should be finely cut up and added to the meals prior to drying off, although as a change they can often be boiled and added to the mash. Clover-meal should be included in all mashes, being well scalded, and bran and middlings can be introduced. The goose does not require an egg-producing ration because it is not in profit in the winter, a point that must not be lost sight of. Ten per cent. of animal food can be added to the mash to replace the natural animal material found in other seasons, and in periods of cold weather some heat-producing elements will be necessary, but in moderation. One can supply these by the use of maize-meal or barley-meal just as one can use as substitutes potatoes, artichokes and the like.

Greenery and roots must be provided in plenty just as they must be for ducks, and clover hay and clover-meal will help in the winter. Fallen fruit can be boiled up and used in the mash and the goose will be quite at home among the " fallers " in the orchard during the proper season. Orchards represent happy hunting grounds.

As the laying season approaches a little extra food can be provided, but it must not be too stimulating. If eggs are forced there is, I have always experienced, a tendency for them to be unfertile to some extent, and that is not desirable. But one can give extra food without it being forcing by the use of greenery and roots to make the mash nice and bulky. The roots can be cut into halves and thrown on the grass as a change, the geese pecking out the insides. After harvesting the geese can be placed on the stubbles to real advantage, although they must be watched towards the end as it may be necessary to give one meal each day should they be getting insufficient food.

Housing.—For success the goose needs a nice dry, well-bedded and well-ventilated house, and as with ducks ample dry bedding is imperative. The feet represent the weakest part of the goose, and in unfavourable elements careful housing is very necessary. Given a well-planned house the goose is easy to handle, being subject to few ailments. In the warm weather, however, the adult stock will insist on sleeping outside and young goslings prefer to sit out on favourable nights. A structure with coach-house doors like that used for ducks will be suitable, and the doors can be thrown open on warm nights, canvas-covered wire-netting inner doors being left in position as described elsewhere. Growing goslings also need dry and well-bedded accommodation.

Is Swimming Water necessary ?—Where there is a nice stream available on the range the breeding stock are naturally happier and better hatching results accrue. It is not imperative, however, to have swimming water, as fertility is good without it. I would sooner have ample range and no water than ample swimming water and little grass-land. The goose, however, is a very heavy drinker, even at night-time, and there should always be handy a plentiful supply of clean drinking water. Many even leave a bucket of water in the house for use at night.

Opinions differ as to whether or not young goslings should be allowed swimming water. Many keep to the rule of not allowing the goslings to take to the water until they are well feathered on the breast, whilst others let them have a swim from the third week. Goslings are wonderfully hardy and early take to the water without any harm. A swimming pan can be provided at the beginning of the third week so long as it is shallow or there are a few large stones on the bottom to help them get out. The weather should be the deciding factor in any case, as it is not wise in cold weather to allow goslings to enter the water too early.

Laying.—The goose begins to lay about February and lays its eggs in batches. In a test the best Chinese goose laid 40 eggs in the season, Toulouse 31, African 30 and Embden 23, with average weights per egg respectively of 5½, 6⅓, 6¾ and 6½ oz. Careful weeding out of stock and selective breeding would increase the egg-returns and judicious handling of the females has an important say in the matter. The goose will lay one batch of eggs and then go broody, but if she is prevented from sitting she will start her second lot of eggs within a few weeks. Some allow the goose to hatch eggs from her second clutch after giving the first lot to ordinary hens, but if she is again prevented from sitting on the eggs a third batch can often be obtained in the same series. Fertility, however, is not always very strong in eggs laid during the third period.

The usual plan is to run the adult stock on year after year, rearing the goslings for market each season. From three Toulouse geese and one Embden gander from 80 to 120 goslings have been reared in one season.

Some owners place the nests inside the house, consisting either of divisions erected at the back and well bedded with nesting material or of sections divided off by bricks. Many place barrels or boxes near their swimming water or put straw in the hedgerow or shrubbery close by, letting the goose make her own nest and hatch the goslings there when she goes broody and is allowed to sit. The eggs should be collected daily and the litter should be carefully inspected, as the goose has a peculiar habit of burying the egg when laid. One can cure the goose of broodiness by confining her to a coop for a few days.

Breeding.—Healthy and vigorous stock should be used for breeding purposes and if a start is made with adults they should be bought in good time ere the breeding season opens. They will under this arrangement have a chance of settling down to their environment before laying commences. In like manner the geese should be mated up before January 1 so that they will settle down ere the laying season commences.

It is usual to mate three females to each gander, although I have used more. Geese will live to quite an old age and in former times it was customary for the farmer's daughter to receive on her wedding day, among other gifts, a goose from the old homestead, and often the bird, we are told, outlived her. There are instances of geese living for 45 and 50 years and one for 75 and another for 100 years, the latter *unfortunately* being killed by a kick from a horse. Geese remain in profit for very many seasons, although it is advisable to introduce fresh ganders occasionally.

Young geese should not be used for breeding purposes and age should always be on one side of the mating. Two- or three-year-old geese give the best hatching results.

Hatching.—The eggs take thirty days to incubate and they can be placed in an incubator, under an ordinary hen, or under the goose herself. If an incubator is employed only geese eggs should be placed therein, because if they are mixed with hens' or ducks' different temperatures will be recorded owing to the various sizes. The usual plan, however, is to set the eggs under ordinary hens, selecting nice large specimens with an abundance of warm fluff. Four or five eggs can be entrusted to each hen and they must be turned by the operator daily owing to their weight. The hens can be set in the customary way, the nests and broodies being dusted with Izal disinfectant powder so that the eggs will not be deserted on account of attacks from insects. If the mother-goose is eventually allowed to sit she can have ten or twelve eggs. Towards the end of the hatch the eggs should be damped as usual.

If the mother-goose is used, a tub makes an ideal sitting-box. The eggs must be turned daily when being stored before being entrusted to the broodies.

Rearing.—Goslings are hardy little things once, like ducklings, they get over the first seven or ten days. If ordinary hens are used they should be shut up in their sitting boxes for a day after hatching, the receptacles being darkened. If this is done they will get accustomed to the voices of their strange children. I like to coop the hen for at least the first week to give the goslings a chance to get strong on the leg, otherwise the hen will go too far afield. After the tenth or fourteenth day—according to the outer elements—the hen can if desired be dispensed with. Goslings can be artificially reared in brooders just as they can be dispatched as day-olds to customers, but these branches have not been exploited to any great extent.

Goslings soon romp along and are out feeding on the grass at a very early age. A swimming pan can be provided from the third week in favourable weather if desired, but at all times there must be ample clean drinking water available. Grit and shell should be supplied, as should charcoal, and sand should be added to the mash as for ducklings.

Damp quarters should be avoided, and a small covered run is an advantage for the first ten days, this being attached to the coop. In the case of a sudden storm the goslings should be driven under cover.

For the Table.—There are three kinds usually marketed, viz. green, stubble and Christmas. The green geese are usually reared entirely on grass after the first week and marketed when three months of age before they begin to moult their wing feathers. Some rearers run them on till four or five months old. The stubble goose is hand-fed for about a month and then passes through the grazing stage until it is placed on the stubbles to clear up the fallen corn, when it is marketed. The Christmas goose leaves the stubble and goes back to grazing, being penned a few weeks before Christmas and fattened up, receiving two meals daily to start with and then three.

Environment will however have a say in the question of hand-feeding. At a very early age goslings commence to graze and this should be encouraged. Raw finely minced greenery should be given in plenty, sometimes in the mash and sometimes in a trough, whilst occasionally it can be sprinkled in a pan of water. Onions and onion tops should be used freely, and foods given to young ducklings will suit the goslings from the start. There are many who fatten up the green goslings for three or four weeks prior to marketing, mashes used for ducklings being suitable.

The goslings should be fed little and often for the first week, when they will be grazing and three meals per diem will be sufficient, which can be reduced to two at the end of the third week. A little animal food should be provided from the second week. To be profitable the goslings must be economically reared in ordinary times and this fact should not be overlooked. A little broken grain can be given the goslings after they are a month old and boiled grain can be provided as a change occasionally. When the goslings are put up to fatten grain can be given daily. If the range is good goslings can however be reared without much hand-feeding after the first week or so.

When being fattened they should be housed in a roomy structure and run in flocks in reasonably small enclosures as free range does not aid flesh-development. Hurdles can be used to form the enclosures and they can be moved to fresh ground as desired. When " stubbled " the geese must be provided with drinking water in plenty.

Killing a Goose.—When you decide to kill a goose remember that it uses its wings for protection and with that member can easily break one's arm. The wings must be tied securely after the bird has been caught and the legs should next be secured with string. Thus tied up the goose should be suspended from a hook and be stunned by means of a sharp blow with a heavy stick on the back of the skull. Next open the mouth and pierce the brain with a sharp knife. Fast the goose before it is killed. Pluck the carcase whilst it is warm and take care of the feathers, as these fetch high prices.

Telling the Sexes.—It is very difficult to tell the sexes of either young goslings or adult geese. There is no curly tail in the gander, as in the drake, although when matured the voice of the male is shrill and fine and that of the female coarse and harsh. In the laying season, too, the females are rounder and fuller at the stern and the ganders are larger, thicker in the neck and more sedate. If driven the ganders will usually lower their necks and hiss and will protect their consorts, which get behind them for protection.

Varieties.—There are not many varieties to select from. The Toulouse (or grey) is an excellent layer—from thirty to fifty eggs or more in a season—and practically a non-sitter. It is a slow grower, perhaps, but reaches an immense size. The Embden (or white) is, on the other hand, a good sitter and a rapid grower, but not such a good layer, producing two batches of eggs each numbering about fifteen. It is usually crossed with the Toulouse to produce an ideal table gosling, an Embden gander being generally employed. The Chinese or African (although some regard them now as slightly different varieties) is excellent for crossing, as it is a splendid layer and quick grower. It can easily be told by the knob at the base of the bill and is bred in two colours, grey and white respectively. The Canadian is a smaller but excellent table variety and is in most demand here for ornamental waters. The quaint Sebastopol is an ornamental variety, as is the Egyptian. Last, but not least, I mention the Roman, which should on its merits be very extensively kept. It is smaller than the Embden or Toulouse, but is a rapid grower, excellent grazer, splendid layer and carries a good amount of choice meat. When fully grown it weighs about 12 lb. or so and is kept chiefly in Southern Europe. Many English breeders have taken up this breed and there should be a good future before it when the stock becomes well distributed.

As regards the weights of the Embden, the standard for ganders is 30 to 34 lb. and for females 20 to 22 lb., whilst Toulouse males are listed at 28 to 30 lb. and females 20 to 22 lb. Chinese ganders weigh from 18 to 20 lb. and females 16 to 18 lb., whilst Canadian males scale 12 to 14 lb. and females 10 to 12 lb. The Embden is keel-less whereas the Toulouse has a keel.

Management and Habits.—Grit, shell and charcoal are three essentials that should always be placed before the geese in a suitable box or hopper. Charcoal should, too, be placed in the mash for both adults and youngsters occasionally as it should for all stock kept on range. Then should they pick up any unclean matter the charcoal sweetens the internal organs and maintains health. For young goslings sand can be added to the mash. All feeding troughs and drinking receptacles should be kept scrupulously clean and be regularly scalded out with boiling water in which a little Izal disinfectant fluid has been added.

When young goslings come home at night they should be carefully counted and if any are missing the pond, stream or ditch should be visited. I have often found the missing one suffering with cramp and apparently unable to get out of the water. In the morning, too, young goslings should be counted because rats are very fond of them and steps must be taken to guard against future raids should any be missing.

The owner should not forget that the goose is awkward and slow of movement. It should not be fed near the larger livestock or accidents may happen as the result of a cow or horse stepping on one of the birds. The doors of the houses, too, should be securely bolted back when open or they may suddenly bang to and injure one of the stock.

Both adult and young geese need protection from the sun's rays, and if the goslings are placed in an enclosure to be fattened up there should be available suitable shade. A low roof of boards erected on supports and cross-pieces will serve our purpose and the arrangement will act as a shelter from rain. Goslings will usually retire to a shelter when it rains, otherwise they should be driven under cover if the weather seems set for wet. Goslings and adult geese eat the grass when wet with rain or dew without harmful results.

Some ganders are very spiteful and it is well when collecting the eggs to carry a stick, particularly if you are nervous. If you do not show nervousness the ganders will not show fight as a rule. Children should not be allowed near geese if the males are spiteful, or near a mother-goose when she is sitting or with young. Some ganders, too, will attack geese of another colony should they trespass too near their own preserves, but temperament plays an important part in the matter.

SECTION III

TURKEYS

Opportunities—Housing—Laying—Feeding and Foraging—Breeding—Hatching—Rearing—For the Market—Varieties.

ENVIRONMENT plays its important part in the rearing of turkeys just as it does in that of ducks, geese and guinea-fowl. That there is ample scope in turkey-breeding for the person who is suitably placed and who will adopt progressive methods I am well convinced.

Opportunities.—The head of breeding stock in the United Kingdom is but a shadow of what it should be and the figures at the last census were recorded as:—England, 146,000; Wales, 26,000; Scotland, 27,000, and Ireland, 176,000. To the farmer, small-holder, innkeeper and country dweller with grass-land available turkey-rearing should greatly appeal. The extent of the undertaking must depend upon the range that can be provided, for the very reason that economical rearing is necessary if the best returns are to be shown. Whilst, however, the general farmer can take up the business fairly extensively owing to his ideal environment and free feeding there is no reason why the person with but one field should not regard turkey-rearing as a paying side-line.

There are plenty of country dwellers who can, but do not, rear a few turkeys for the Christmas market, just as there are very many farmers who can, but do not, bring up a nice flock. If the yearly profit is but £10 this is surely a sum worth securing from just a small side-line. On the other hand turkey eggs fetch a very high price when sold for sitting purposes, and if a good strain is bred and maintained the sale of eggs for incubation will be found to be a very remunerative side-line. The market, too, is not overcrowded, thus giving the amateur a chance of making his way in the eggs-for-sitting branch which can if desired be supplemented by rearing for the Christmas markets.

Where turkey-breeding is engaged in as a side-line separate accounts should be kept so that the owner will know how he or she stands as regards profits at the end of each season.

When commencing turkey-keeping it is essential to buy eggs or stock from a reliable breeder. It is very unwise to purchase from an unknown source where in all probability in-breeding has been resorted to. If the parents are weak, mortality will be heavy· The professional breeders who are interested in the breeding of exhibition specimens have to breed for size, as this is one of the most important points in a show bird. They are therefore most careful in their matings in order to maintain vigour in their strain, and a gobbler or stock purchased from such a reliable source will mean all the difference between success or failure. Some breeders charge as much as three guineas for a dozen eggs for incubation purposes, replacing unfertiles or refunding the money for same. Such prices are well worth paying to procure the right material, as at the back of the purchase is the breeder-vendor's long experience in breeding operations.

Housing.—If success is to be achieved due consideration must be paid to the housing question. Roomy, dry, well-ventilated and well-lighted structures are essential, stuffy and dark quarters being very undesirable. There must, too, be ventilation without draught and utter cleanliness must be observed. An outhouse, shed, or barn will serve as suitable accommodation so long as the structure conforms to the description I have given. A glass window or two will quickly turn a dismal house into a light one and wire-netting apertures controlled by canvas screens or shutters will admit fresh air for ventilation. The floor should be dry and be well bedded down with litter—straw, peat moss, bracken, dried leaves or whatever is available—and in the day-time the doors should be thrown open so that the interior of the house will get an airing.

Double coach-house doors are preferable and these should be securely fastened when open. Failing this type select wide single doors.

Turkeys love to sleep out at night and will make themselves comfortable on gates, under open-fronted cart-sheds, on fences or walls, or in the trees. When matured turkeys do not seem to come to harm from such open-air roosting in even cold or wet weather. Young stock, however, should not be allowed to roost out of doors despite the fact that they will show a desire to do so at quite an early age. The main thing is to provide a well-ventilated and roomy house. The roosts should be fairly broad and stout and be placed at a good height as turkeys like high roosting. The usual plan is to arrange several perches in steps, each higher than the other and about 2 feet apart.

Utter cleanliness is necessary and interiors of all houses and coops should be frequently white-washed, a little Izal disinfectant fluid being added therein. The bedding should be renewed and replenished as required and will keep all the fresher if occasionally sprinkled with a weak Izal wash. Perches, too, should be scrubbed with hot water and Izal disinfectant soap, and placed in the sun to dry. The house should face the south. Adult turkeys are hardy, but they cannot stand damp housing or surroundings. Keep feeding and drinking vessels nice and clean.

Laying.—The corners of the house can be sectioned off by means of bricks for nests, the spaces being bedded with straw. Often the turkey hens will prefer to lay in the field or the orchard, in nettles down the hedge-row, or around the ricks. A careful look-out should be kept during the laying season so that the eggs can be collected regularly. A dummy egg or two can be left in each nest, and as the laying season approaches some straw can be placed in quiet spots where the hens are likely to make their nests. If the eggs are not collected the stoat may sample them, or some passer-by, and they are too valuable to lose. Roomy nests are needed and, if desired sections can be divided off by low wooden partitions in the rear of the house, or a few barrels can be brought into use as nest-boxes, these being well lined with material. Such receptacles can also be used to advantage out of doors and make excellent sitting-boxes for the turkey hens.

The laying period is from March to May, from twelve to eighteen eggs being laid in the first batch. The hen will then show a desire to sit, but if she is shut up for a day or two she will follow with a second batch of a like number. Some hens are exceptional layers, averaging more than fifty eggs in the season, and as many as a hundred has been reported.

Feeding and Foraging.—As regards the feeding of the adult turkeys this must be attended to with great care. Feeding and foraging go hand in hand just as they do with ducks and geese. It is a great waste to have ideal range and not to make the most of it. I place emphasis on this because turkey-owners are too fond of feeding their stock day in and day out on grain. Apart from the waste of environment there is the extra cost of foodstuffs to consider, heavy hand-feeding naturally reducing the profits. To obtain economical feeding the turkey-breeder must make full use of his range.

The turkey is a very wise bird and misses very little in the way of natural food. One has but to watch the turkeys when foraging to notice this at once. They search every nook, and fly-catching is engaged in extensively before the birds are a few weeks old. One can easily spoil turkeys kept on range by overfeeding them, and that is the first maxim to learn. On the other hand the birds must not be allowed to get out of order through underfeeding. All things considered then it is wise to take into account the quality of range offered and the amount of free feeding obtained, at the same time so handling the stock that they secure as much free food as possible. A mixed range of orchard, pasture, woodland and banks bordering water is ideal, and the turkeys will miss very little by way of fallen fruit, nuts, berries, seeds, grubs, insects and greenery—all their natural foodstuffs.

To encourage foraging during the many months when such natural foods are abundant a breakfast must be withheld. Only an evening meal should be provided during such times just to keep the stock tame and to entice them home, but if the range is more or less ideal this need not be on the heavy side. Sometimes soft food can be given as this evening food and at other times grain. Grain-feeding I am not in love with except in moderation, as it tends to fatten the birds and does not aid egg-production to any great extent, although in moderation it may mean strong chicks. I do not recommend the withholding of grain but advise breeders not to give it too freely. There are plenty who give a full feed of grain during the summer for both breakfast and tea, but this method does not yield the best results.

A turkey is a good eater, taking quite twice as much as an ordinary fowl, but it is more or less a constant feeder, taking a little at a time. In the winter the birds will need two feeds daily and will do better perhaps on three, the noon meal being a light one. Soft food can be given for breakfast and grain for tea, with greenery or roots at midday, or mash can be given for both morning and night, with grain at midday. The evening feed should always be a nice full one. As the turkeys will not be laying in the winter months they will not require foodstuffs to supply material for the eggs or to repair the wastage brought on by heavy laying. They will need animal food to replace what they can find for themselves on range during the natural season and also greenery. In cold weather, too, they will need heat-producing foodstuffs.

The turkey-breeder must be careful not to get the stock too fat over the winter so that they will be out of breeding condition when the laying season arrives. And he must also take care to see that they are not underfed or they will again be out of breeding condition. Many people are under the impression that overfeeding is the only cause of excessive internal fatness. Rather is it the unwise mixing of the ingredients of the mash. Where plenty of greenery and roots is included in the mash, sometimes raw and sometimes boiled, this will make the soft food bulky and filling without its being fattening. During cold spells a little maize, maize-meal, barley, barley-meal, boiled potatoes or boiled artichokes may be given, but such foodstuffs must be fed with proper judgment if the birds are to remain in good condition for breeding. Clover-meal or clover-hay, raw greenery and roots (swedes, turnips, mangels and the like) should play an important part in the winter menu and animal food can be represented by about 10 per cent. by weight.

Boiled and raw greenery and roots are splendid lubricants and aid the smooth working of the laying organs, and when the laying season approaches the turkeys can be put on to more stimulating foods to encourage the production of eggs without unduly forcing them. The animal food can be gradually increased, as where greenstuff is fed liberally one needs a little more fish-meal, meat-meal, greaves, or green cut bone to aid and maintain egg-production. With the turkeys having a morning and evening mash and a midday feed of grain just prior to the time eggs are wanted they should come into lay early. When they are put on range feeding should be reduced gradually as sudden changes are far from advisable in the case of any livestock.

Grit, shell and charcoal should always be kept before the birds and sometimes charcoal and sand can be added to the soft food to real advantage. Charcoal should be more widely used for all our smaller livestock. Soft food should be given in troughs, whilst the grain can be thrown broadcast over the ground, a different spot being selected each time. Sometimes the grain can be boiled as a change. Clean and fresh drinking water must always be available and all utensils must be kept scrupulously clean, being scalded out with hot water containing a little Izal disinfectant.

Turkeys are often somewhat fussy as regards feeding and it is well to bring them up in the way they are to go. Some breeders use boards for the soft food, whilst others employ troughs, and not a few scatter the mash on the grass. I am not in favour of the latter and prefer troughs to boards, but if troughs are selected the food should always be placed therein during the growing stages. It is well, too, to encourage the turkeys to take food offered them from the hand so that they will become docile, as much better results accrue where the stock birds are tame. They will also consent to be handled should an occasion for same arise.

As regards the choice of grains, wheat and oats are preferable, and they can be given together in equal parts by weight and alternately as a change. During cold spells maize (kibbled for choice) or barley can be introduced to the extent of one part to every four parts of the usual grain diet. Oats can be sprouted to advantage to provide succulent and cheap green sprouts which will be most useful for ducks, geese and guinea-fowl as well as turkeys. The sprouting of oats should be practised more extensively.

Breeding.—Breeding stock must be selected with care, as mortality among young turkeys can often be traced to faulty matings. Well-matured birds should be used, as young stock seldom produce strong and rearable progeny. The heaviest weights can only be recorded where wise matings are carried out, and it must be remembered that turkeys take two or three years to mature. Two-year old and more males should be used with pullets and adult hens with cockerels, it being advisable to have age on one side.

Medium-sized birds, as with geese, give the best quality table progeny and those with long breast-bones should be preferred to others. Males weighing from 20 to 25 lb. and females some 5 to 7lb. less are usually employed. Do not in-breed but introduce fresh blood every few years to maintain weight and stamina.

Environment will decide the number of females to place with the male as will the condition of the latter. On a nice range ten females may be used with success, although from four to eight may be considered the usual number. One visit to the male is sufficient to fertilize the eggs of one batch of laying.

Turkeys like to be quiet during the breeding season, for which reason they should not be unduly disturbed or frightened in any way. The same person should, if possible, look after the stock each day, and if the male is petted and made docile better hatching results will be experienced. He should be fed by himself occasionally so that his condition can be ensured and a tonic will do good for all the birds during the breeding season. Breeders must be kept hard and fit and overfeeding must be avoided. An abundance of clean fresh drinking water is imperative, and specimens that have ailed should not be bred from. Avoid puny immatured specimens and be sure and start with eggs or birds from a reliable source.

Hatching.—The usual plan is to set the eggs from the first batch under ordinary hens and to let the turkey-hen take care of the second batch. When her chicks come off many place with them those from the earlier eggs that have been hatched under hens. The ordinary hen can manage six or seven eggs and the turkey-hen fifteen or sixteen. It is well to adopt the combination of the two hens, as the turkey female can easily manage twenty-four chicks or more and I have had as many as thirty under the care of one hen. The eggs take twenty-eight days to incubate.

The turkey-hen is rather timid and the method of handling must depend upon the temperament of the individual. If she is very tame the owner can set her in the place he selects as his ideal, otherwise it is well to let the bird choose her own nesting-place. A quiet, snug nesting-place is preferred and the gobbler (i.e. male) should be kept away from her as he is usually spiteful and will often kill the chicks.

When about to lay the hen will be noticed foraging in and out of quiet places, and having selected her nest, and after the broody fever has got a good grip, put the eggs to her. These eggs should be marked so that should she continue to lay for a short time the fresh eggs can be removed. A barrel makes a good sitting-box, but if the hen prepares her nest on the floor place a large bottomless coop over both nest and bird whilst she is sitting. Whatever is done to make the surroundings as natural and secluded as possible is to be strongly recommended.

Personally I do not recommend the handling of the turkey-hen when she is sitting unless the same is absolutely necessary. If, of course, she consents to such handling no harm will accrue, and to help matters the same person should tend to her wants every day. A dust bath should be available as should clean and fresh drinking water and the broody should be fed on maize, soft food being withheld. If the hen leaves her nest daily of her own accord for a stretch and a meal so well and good ; if not she must be gently taken off. Do not feed her as she sits on the nest, although drinking water can be left within reach. So protect the hen, too, that other stock cannot go near to her annoyance or disturbance. The eggs should not be tested if the hen is awkward, but they should be damped a day or so before they are due to pip to soften the inner membranes.

To rear successfully the chicks they must be kept free from insects. The turkey-hen should be well dusted with Izal powder before she is allowed to sit as, too, should be the ordinary hen. Izal powder, too, should be sprinkled over the nest and eggs and be mixed freely and regularly with the dusting material. Just before the eggs are due to hatch another dusting of the nest with the Izal disinfectant powder is to be recommended.

Rearing.—The turkey-hen makes an ideal mother, being very gentle and not taking the chicks when young too far afield. Personally I prefer to coop the mother—turkey or ordinary hen—for the first week or ten days to give the little ones a chance to get strong on the leg. They will need no food for thirty-six hours, and as they are sometimes slow at commencing to pick up some breeders often introduce an ordinary chick or two to teach the young turkeys what to do. To enable this to be done one or two hen's eggs are placed under the broody after the turkey eggs have been incubating seven days.

Dry environment is essential and the chicks must not be allowed in the wet grass. Rain-storms should be guarded against by having a sheet or two of zinc handy to place against the front of the coop or by arranging a covered-in run. Turkey chicks are perhaps difficult to rear, but success is readily achieved if common-sense methods are adopted. The main thing is to include plenty of finely-minced succulent greenery in the menu, adding it to the soft food and sometimes giving it as a separate meal in a trough. Drinking water must be kept always available and it must be fresh and placed in the shade. Finely minced onions and onion tops should be used as such will guard against gapes. Lettuce is also excellent, and chopped stinging nettles, grass, dandelions and the like can all be used.

The next thing is to provide animal food from the second week, say 5 per cent. by weight three times weekly. It can be in the form of greaves (boiled), fish-meal or meat-meal and occasionally ants' eggs will be appreciated. A little sand should be added to the soft food regularly, and occasionally a small amount of powdered charcoal will do much good and help to ward off ailments. To aid the development of frame bone-meal can be added to the mash in moderation. Grit and charcoal should be kept in a hopper always handy.

The chicks can be started with boiled egg and breadcrumbs, minced raw greenery being added thereto from the second day. Sussex ground oats can also be used and " little and often " should govern the system of feeding. Rice can be boiled and dried off with middlings or ground oats and biscuit-meal can be used occasionally as the basis of the soft food. At no time should succulent greenery be stinted.

Most rearers introduce dry chick food or seeds from a very early age, but I am convinced that this is the cause of heavy mortality. The seeds are for the most part very hard and indigestible and do not suit turkey chicks as they do ordinary chicks. Keep to the soft food for the first month or six weeks, when hard food can be introduced as the evening meal. Then, however, instead of using hard chick seeds give split wheat and groats and when the youngsters get older use whole wheat and whole groats. At six weeks of age three meals can be given, two being soft food and the other—for tea—grain. The latter can occasionally be boiled as a change.

Choice of foods must depend upon the object in view. If the young turkeys are intended for market the best foods can be used if the tip-top channel is being catered for, otherwise coarser foodstuffs must be employed. It is well, however, to encourage the young chicks to forage with their mothers from quite an early age so that they will be able to keep down the food-bills. If environment is good they will find very much food and hand-feeding can be varied accordingly. The coops should be moved to fresh ground daily and the same rearing ground should not be selected two seasons in succession. Keep them off wet grass when very young and provide shelter from rain.

When the turkeys are from six to eight weeks old " shooting the red " takes place, and during that time they need a tonic and special care. Afterwards they soon go ahead and will begin to show a desire to roost in the trees. This can be encouraged if the turkeys are being reared near the homestead and the weather is favourable. If in the fields shelters with perch accommodation therein can be arranged for and should they take to open sheds this can be allowed, the perches being placed reasonably low. Too-early perching, however, is not recommended. At all times stuffy quarters must be avoided, as must overcrowding.

Insect pests are often troublesome and all coops should be whitewashed inside as advised. Keep an eye on the youngsters and if the head and neck are affected rub into the feathers a little sweet oil. Frequently dust the chicks with Izal disinfectant powder. Gapes can be guarded against by the use of fresh rearing ground each season, by the free use of minced onions and tops and by camphor water. To prepare the latter scrape a few flakes of block camphor into a jug of boiling water and having allowed this to cool give it once or twice a week as the drinking water. In case of attacks the invalids can be treated as ordinary chicks are.

Diarrhœa is often met with and as a cure give boiled rice dusted with pulverized chalk. Avoid sloppy food and regularly add powdered charcoal to the mash. Improper feeding or housing is often to blame for this ailment.

Liver trouble, is often experienced, the chicks becoming mopish and the droppings being greenish or yellowish (more advanced). A course of my Glauber's salt treatment will flush the liver. Exceedingly white excrement will denote kidney trouble and one drachm of iodide of potassium to six ounces of water is recommended. In the case of a cold give any strengthening tonic, which will be helpful during the shooting of the red and the growing stages if given occasionally, once a week say. Burn the carcases of all young turkeys that die and lime the rearing ground after the turkeys have been marketed.

For the Market.—After foraging and light feeding the turkeys can be placed on the stubbles and they should by then be well built, possessing nice frames that will carry the flesh the owner wishes to put thereon later. About five or six weeks before they are required for the market they should be placed in smaller enclosures and fattened and they can be boarded in a large barn or outhouse in a flock. Two good meals can be given at first—mash for breakfast and grain for tea—and an additional mash at midday can be introduced towards the end. Ground oats, barley-meal, skim milk, boiled potatoes and artichokes, maize, melted fat, maize-meal, boiled vegetables and the like can be given and grit should not be overlooked. Some rearers confine the turkeys entirely to sheds during the fattening process, whilst not a few use a large barn and allow the turkeys out for a run daily at meal-times only. Choice of foodstuffs must be left to the individual rearer, but the important factors are (1) to keep the turkeys growing all the time, and (2) to utilize range for free-feeding as much as possible. The turkeys can be marketed in November, December and February, according to their hatching and degree of forwardness.

Before the turkey is killed for market it should be fasted for twenty-four hours. The usual method of killing is to hang the bird up by the legs with its wings crossed to prevent struggling. The bird is then stunned by a quick blow on the back of the neck and a knife is inserted in the roof of the mouth so that the brain is pierced. The turkey is then roughly plucked all except head, neck, and pinions and the carcases are not packed until they are thoroughly chilled. Each is wrapped in a linen cloth which has been previously dipped in skim milk when dispatched to the market.

Varieties.—The would-be turkey-keeper has not a host of breeds to select from. Those worthy of mention are the American Mammoth Bronze, Norfolk Black, Cambridge Bronze, Whites, Buffs and Blues. The heaviest breed is undoubtedly the American Mammoth Bronze with standard weights for adults of 34 to 36 lb. for males and 18 to 20 lb. for females. These weights are often passed and cocks have scaled as much as 45 lb. and hens up to 30 lb. Writing to me recently Miss E. J. Appleyard, of Eastern Poultry Yards, Ixworth, Suffolk, mentioned the fact that the male heading her best breeding pen weighed 33 lb. when but nine months old. This enthusiastic lady-breeder of pedigree Mammoth turkeys has registered some very heavy weights for her stock, and as she possesses a Palace-winning strain, such can be readily understood, as size is a *sine qua non* with exhibition Turkeys. The Mammoth Bronze is noted for its massive and deep body, prominent breast and graceful carriage, whilst its plumage is a brilliant metallic bronze.

Whilst the Mammoth holds pride of place as a market bird the White is a good second, cocks scaling 35 lb. and hens 24 lb., whilst 30 lb. has been recorded for a Palace-winning cockerel at nine and a half months of age. The Norfolk or Black is well known for its juicy meat and its plumage is a lustrous black. Adult males weigh up to 26 to 27 lb. and hens 18 lb. The Cambridge Bronze possesses a dark-coloured plumage but fails to the Mammoth in the brilliance of sheen. It is not such a cobby bird, possessing no keel, as it were, which gives it a smaller appearance. Adult cocks weigh 24 to 26 lb. and hens 16 to 18 lb.

SECTION IV

GUINEA-FOWL

On the Farm—Eggs and Flesh—Feeding—Housing—Laying—Hatching and Rearing—Peculiar Habits—Varieties.

THE guinea-fowl is a quaint member of the feathered tribe and in many parts of Africa is still found wild, although it has now been domesticated to such a degree as to be kept with profit amid suitable surroundings.

On the Farm.—It is on the farm that the guinea-fowl should be more popularly kept, although all who have free range to offer will find this quaint fowl very profitable. They are easy to manage, although it is wise to start with sittings of eggs and rear the chicks so that they become acclimatized. Newly-purchased adult stock have a tendency to stray. Adult guinea-fowl are quite easy-going and like to roam in search of food, returning at night to the homestead to roost in the trees or in their proper quarters, whichever they are accustomed to.

Eggs and Flesh—It is not everybody who has tasted a guinea-fowl's egg or sampled its flesh, both of which are regarded as a dainty delicacy to be appreciated. The eggs are a pretty speckled brown and very rich and tasty, whilst the flesh is dark but very delicate and "gamey." There is naturally a keen demand for both as the supply is not heavy, and when spring chickens are scarce and the game season is drawing to a close the guinea-fowl comes into its own for the table.

There is a good demand for sittings of eggs, also stock birds, and it would pay breeders to take up the guinea-fowl as the market at the moment is not full. Few breed them for sale and it is possible to keep the fowls in large flocks so long as the sexes are kept even in number to allow them to pair as in their wild state. Our woods might be improved by the introduction therein of this quaint member of the feathered tribe. It is not generally known that the guinea-fowl has graced the show-bench, but this is so, my friend, Mrs. W. B. Goode, of Aldborough Lodge, Boroughbridge, Yorks, having won innumerable prizes with beautiful specimens of her own breeding. This well-known exhibitor has done much to popularize the guinea-fowl, as she has the Rhode Island Red.

The guinea-fowl, across the water, is used extensively at banquets in the place of pheasants and is in high demand also during the close season.

Feeding.—The guinea-fowl is quite a continuous feeder, wandering far afield and eating a little at a time. Fond of beetles, insects and grubs the guinea-fowl is a splendid " land-cleaner " and on suitable range is self-supporting. A little extra food can be given to bring the hens into lay and occasionally a little grain can be given during the summer for tea. In the winter a morning mash and evening grain feed are recommended. It is a small eater and is never happier than when out foraging on the " go-as-you-please " system, and it is practically self-supporting for the greater part of the year.

The guinea-fowl is somewhat spiteful at feeding-time and should not therefore be fed with the other fowls. Scatter their grain away from the latter. One can take the guinea-fowl straight from the range and find it ready for the table without any special course of fattening.

Housing.—The guinea-fowl is easily managed and will roost in the trees, taking the highest branches when the weather promises to be fine and the lowest ones when it threatens to be unfavourable. One can however train them from young to roost in houses, any roomy well-ventilated structure with high perches being suitable. The farmer usually allows them to roost with his fowls in their house near the homestead, but separate housing is to be recommended. If roosting in the trees is not deemed advisable the young guinea-chicks should be driven into their special sleeping-house each evening just before it gets dark, when they will take kindly to this accommodation and show no desire when matured to stop out at night.

Laying.—The guinea-fowl commences to lay about February or March and continues until the end of September. The number of eggs laid will vary for the very reason that no special care has as yet been taken in producing by selective breeding a heavy strain of layers. Some will lay from eighty to a hundred or more eggs in a season. They make their nests in stinging-nettles, in the hedge-row or in undergrowth of some kind and will forsake the nests if the latter are disturbed. It is advisable to watch the fowls from behind a tree and the nests can then be easily located, particularly if the look-out takes place when one female is noticed to be missing from the others. The eggs should be removed by means of a large spoon, care being taken not to touch the material with one's hand and one or two dummy eggs should be left always in each nest after the first removal takes place. The eggs can be removed quietly daily, but the birds must not see you visiting the nest. The shells are much thicker than those of hens' eggs.

Hatching and Rearing.—The fowls should be run in trios, quartets or quintets—two, three or four females to each male—and during the breeding season they should not be unduly disturbed as they like quietude at that time. The guinea-hen does not go broody till the end of the summer, and being an unreliable sitter and mother it is best to trust the hatching and rearing to an ordinary hen. The eggs take from twenty-six to twenty-eight days to hatch and they should be damped with luke-warm water a day or so before they are due to pip. The chicks are delicate perhaps at first in that they require careful handling and feeding. The main thing is to " coop " the hen for a week or so until the chicks are strong on the leg and to provide them with a dry run at the start. They must be fed little and often and when weaned they should have a nice dry shelter to go to if it rains. Plenty of finely-chopped green-food is necessary from the start, otherwise they may be fed on the same lines as ordinary chicks. When two or three months old they will forage well and require little hand-feeding. When hand-reared they become very tame, which is a good advantage with matured stock. If the same person attends to them daily they will become quite docile and take food from the hand. Animal food is necessary from the second week and ants' eggs can be included in the menu to advantage.

Peculiar Habits.—The guinea-fowl has very peculiar habits. It is a good weather-prophet when roosting in the orchard and a reliable watch-dog, uttering notes of warning when disturbed. The call very much resembles "come—back" or "come—Frank," this coming from the female, whereas the male gives vent to a shrill shriek like "quit," "quit," and arches his back as he goes along. Otherwise it is difficult to tell the sexes although the wattles are larger and a brighter red in colour in the male than in the female.

Ordinary hens are usually alarmed when they hatch out goslings or ducks and are best shut up in their hatching-box for a day until they get accustomed to their "strange" brood. They do not, however, notice any difference with guinea-chicks. The latter when reared by the ordinary hen are very affectionate and will seek her company long after they have been weaned and even matured. I have known the guinea-chicks when grown up insist upon roosting with their foster-mother and take to the same nest when laying commenced. Should the hen start to lay when the chicks are still with her it is a common sight to see all of them sitting in the nest-box whilst the mother-hen is doing her duty. Guinea-fowl follow each other like sheep and what one does the other follows suit with if it is only flying on to a wall.

Varieties.—There are three varieties—pure white and dark and light speckled (or lavender), the dark ones being the favourite perhaps. The plumage is handsome, being a beautiful even blue-grey, with every feather evenly speckled all over with delicate white round spots. The head-gear is unique, for a bristly-looking mane extends down the neck, whilst the latter is void of feathers where it joins the head, being covered with a white kid-like skin. The wattles are red. The birds always look nice and clean and smart in appearance.

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